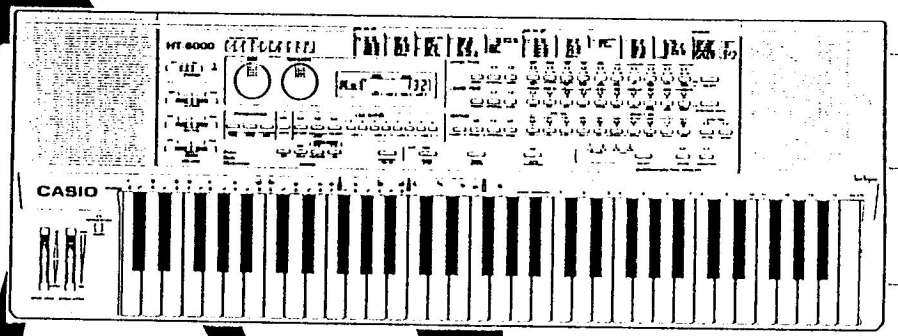
CASIO

CASIO
HT-6000

ELECTRONIC MUSICAL INSTRUMENT
INSTRUMENTO MUSICAL ELECTRONICO



OPERATION MANUAL 3

MANUAL DE OPERACION 69

英文

OH1101187C Printed in Japan

CASIO HT-6000

PROGRAMMABLE DIGITAL SYNTHESIZER

Introduction

Thank you and congratulations on your purchase of the Casio HT-6000 Digital Synthesizer. Your new keyboard features exciting features and functions, and the latest in digital sound technology. To obtain optimum performance and assure long-term reliability, be sure to read this manual carefully before using this keyboard.

Main Features of the HT-6000

1. TONE EDITING & WRITING

Although the HT-6000 is a digital keyboard, its built-in sounds are created in a system which is very similar in design to analog synthesizers, so that HT-6000 tones can be freely edited or even written from scratch by altering various parameters which determine the characteristics of each individual sound. This allows you to edit preset sounds to your liking, or make your own original sounds.

2. MIDI COMPATIBILITY

The HT-6000 is MIDI-compatible, for connection with other MIDI synthesizers, sequencers and memory devices.

3. CHORD/OPERATION MEMORY

The HT-6000's CHORD/OPERATION MEMORY function allows you to create backing chord patterns for two different songs, each containing up to 427 chords, as well as 197 different "operations," including changes in Tone, Rhythm, modulation, auto-harmonizing, fill-ins and endings, for auto-accompaniment of your original songs.

4. TOUCH RESPONSE

The HT-6000 features touch response, which gives you advanced control over keyboard dynamics. You can even program unique effects to respond according to key touch.

5. PATTERN MEMORY

The PATTERN MEMORY function allows programming of up to ten 2-bar patterns and ten 1-bar fill-ins, including bass, rhythm, and chords. Create your own accompaniment patterns and play along! In addition, you can change the basic rhythm of your original patterns by selecting any of the Auto-Rhythm tracks.

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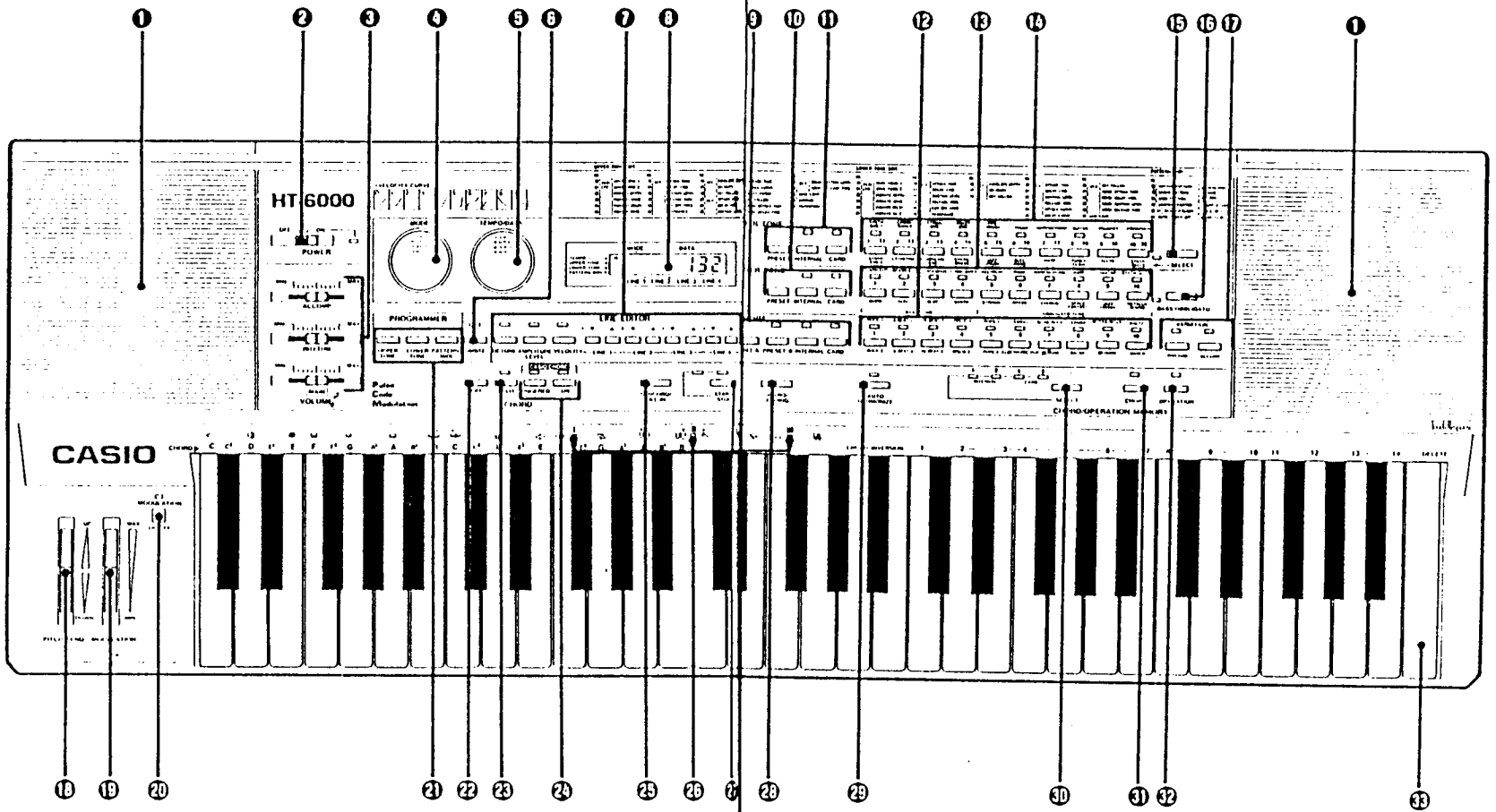
Control Locations



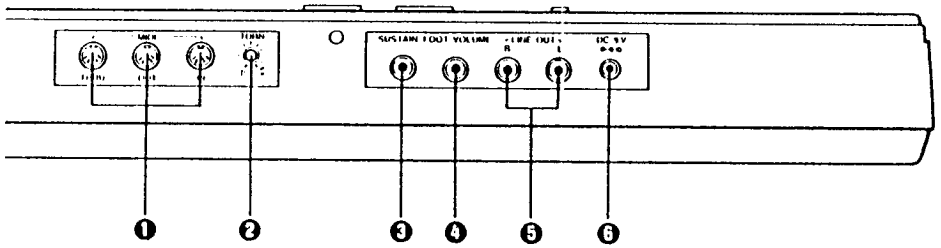
❶ Speakers
❷ Power switch
❸ Volume sliders
❹ Mode dial
❺ Tempo/data dial
❻ Write key
❼ Line edit keys
❽ LCD display

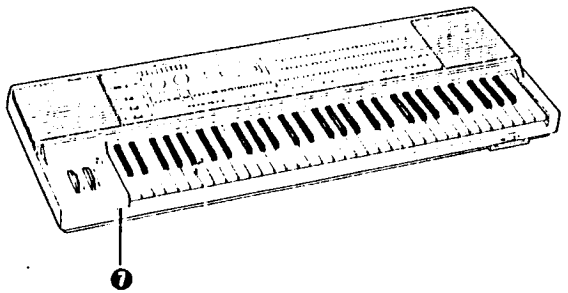
❾ Rhythm source keys
❿ Lower tone source keys
⓫ Upper tone source keys
⓬ Rhythm selectors
⓭ Lower tone selectors
⓮ Upper tone selectors
⓯ Select key
⓰ Bass/obbligato key

⓱ Variation keys
⓲ Pitch bend wheel
⓳ Modulation wheel
⓴ Modulation ON/OFF button
㉑ Program keys
㉒ Casio Chord Off key
㉓ Keyboard split key
㉔ Casio Chord keys

㉕ Synchro/fill-in key
㉖ Keyboard split point indicators
㉗ Start/stop key
㉘ Intro/ending key
㉙ Auto-harmonize key
㉚ Chord/operation select key
㉛ Chord key
㉜ Operation key
㉝ Delete key

(Rear panel)





❶ MIDI terminals
❷ Tuning control
❸ Sustain jack
❹ Foot volume jack
❺ Output jacks (R/L)
❻ AC adaptor jack
❼ Headphone jack

Getting Started

■ CHOOSING A POWER SUPPLY

The HT-6000 can be powered by dry-cell batteries, standard household current, or a car battery through the vehicle's cigarette lighter.

•AD-5 AC Adaptor

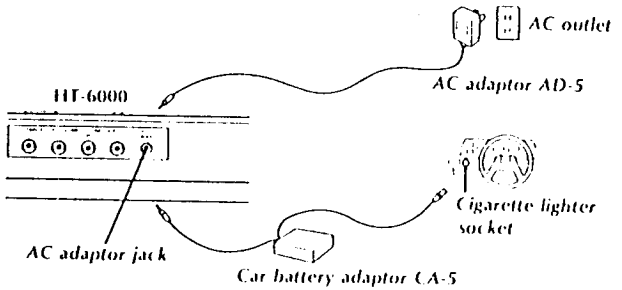
Connection of an AD-5 AC Adaptor (optional) allows the unit to be powered by standard household current.

•Car battery

Connection of a CA-5 Car Battery Adaptor allows the unit to be powered by a car battery, through the vehicle's cigarette lighter.

•Dry-cell batteries

The HT-6000 uses 6 "D" cell (SUM-1) batteries.

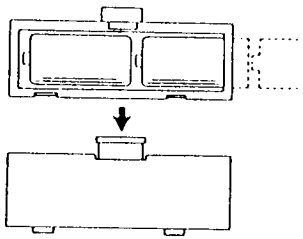


■ BATTERY REPLACEMENT:

① Slide open the battery compartment cover on the bottom of the unit.

② Insert new batteries, making sure that polarity is correct.

* *Always replace all six batteries at the same time.*
* *Do not mix fresh and old batteries.*



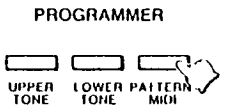
The battery life of high-performance D-cell batteries is approximately 5 hours. Weakened batteries will cause the power indicator to lose its brightness and result in distorted tonal quality and finally malfunctioning of operations. Replace all six batteries with new ones when you notice these symptoms.

■ AUTO POWER OFF FUNCTION

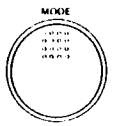
Power is automatically cut off approximately 6 minutes after the last operation of the unit. Power supply can be restored by switching power OFF and then ON again.

Auto power off function can be cancelled by the following procedure.

(1) Press the PATTERN/MIDI key.



(2) Set the parameter to "60" by the mode dial.

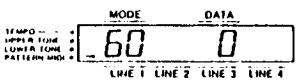


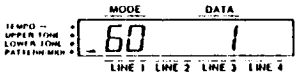
(3) Turn the tempo/data dial right to set the value "1".

CAUTION

- Use only genuine CASIO adaptors to avoid risk of damage.
- Remove batteries from the battery compartment when the unit is not used for extended periods. (Battery leakage can damage electrical parts.)
- The adaptor may become warm when left connected to an outlet. This is normal, but the adaptor should be disconnected when not in use.
- THE FOLLOWING CONDITIONS CAN CAUSE BATTERIES TO BURST:

1. *Use of adaptors other than genuine CASIO adaptors.*
2. *Loading batteries with polarities reversed.*



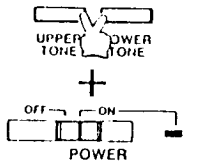


■ INITIALIZING THE HT-6000

To initialize data (return all operations to factory preset state):

(1) Turn power OFF.

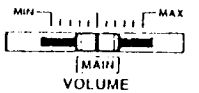
(2) Hold down UPPER TONE key and LOWER TONE key of the program keys simultaneously and turn power ON.



● To make music on the HT-6000

(1) Turn the power switch ON.
After selecting the power source you intend to use and making necessary connections, switch power ON.
The power indicator will light. Immediately after the power is turned ON, the "SYNTH-ENS 1" tone (timbre) and "ROCK 1" rhythm are automatically selected.

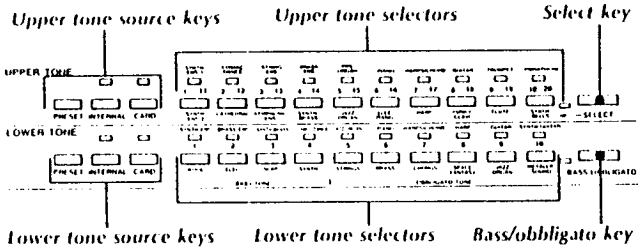
(2) Adjust the volume.
Using the main volume slider, adjust the main volume to an appropriate level.



Now, go ahead and get a feel for the HT-6000 keyboard. Notice that in this initialized mode, the SYNTH-ENS 1 tone sounds on all keys of the keyboard.

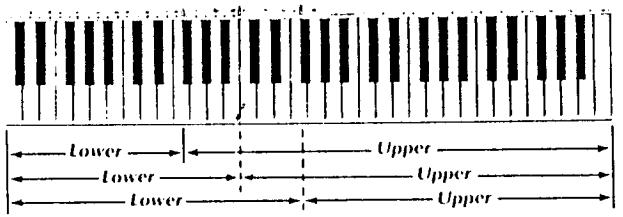
Keyboard Tones

The LTL-6000 features a total of 40 factory-programmed upper tones, including 20 preset tones and 20 internal tones. It also features 20 lower tones, including 10 preset tones and 10 internal tones from which you can choose when the keyboard is in a "keyboard split" status.



■ KEYBOARD SPLIT

The LTL-6000 keyboard split function lets you "divide" the keyboard into upper and lower sections, at any of three keyboard split points.



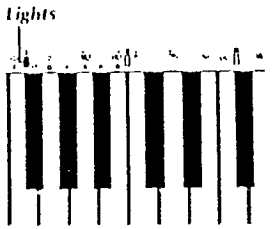
These keyboard split points are indicated by red LEDs. When the keyboard is split, you can play different tones on the upper and lower sections.

* *Notice that in the initialized mode, the selected upper tone sounds on all keys of the keyboard.*

• To split the keyboard

①Press the keyboard split key.

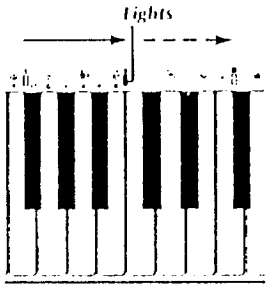
You can now select a tone for the lower tone keyboard, which includes all keys below the keyboard split point.



• To change the keyboard split point

①Subsequently pressing the keyboard split key causes the keyboard division to be moved to the next LED-indicated point.

* *The keyboard split function is selected automatically whenever the Casio Chord function is selected. (see page 20)*



■ UPPER TONES

The LTL-6000 is equipped with 20 factory "PRESET" tones, plus 20 "INTERNAL" tones. An additional 20 "CARD" tones can be utilized through the use of an optional RAM card (RA-100).

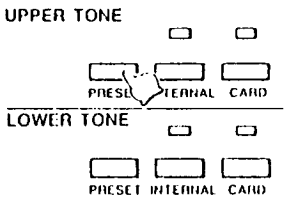
■ LOWER TONES

Whenever the keyboard split function is in effect, you can choose from any of 10 "PRESET" and 10 "INTERNAL" tones for the lower half of the keyboard (below the keyboard split point). An additional 10 "CARD" tones can be utilized through the use of an optional RAM card (RA-100).

• To select a keyboard tone

The same basic operations are used to select both upper and lower keyboard tones.

①Specify the tone source to be used by pressing any of the tone source keys, "PRESET", "INTERNAL" or "CARD" key (if RAM card is in use).



(2) Select a tone (tone number 1 through 10) by pressing one of the tone selectors.

In the case of upper tone selection, tone numbers 11 through 20 can be selected by pressing the select key (green indicator lights).

* *Tone number 9 is selected.*

* *Tone number 19 is now selected.*

■ INTERNAL TONE INDEX

Tones listed on the display panel correspond to the "PRESET" sound sources. Refer to the guides shown at the right when selecting "INTERNAL" tones.

(Upper INTERNAL tones)

1	Synth-Ens	11	Brass Ens 2
2	Space Fantasy	12	Metallic Sound
3	Chorus	13	Synth-Sound
4	Synth-Harp 1	14	Fantasy
5	Pipe Organ 2	15	Jazz Organ 2
6	Piano 2	16	Synth-Celesta
7	Harpsichord 2	17	Synth-Harp 2
8	Harmonica	18	Clarinet
9	Synth-Reed	19	Synth-Guitar
10	Steel Drum	20	Marimba

(Lower INTERNAL tones)

1	Synth-Ens 2	6	Elec Piano
2	String Ens	7	Metallic Sound
3	Synth-Brass 2	8	Funky Clavi
4	Synth-Bass	9	Synth-Harp
5	Pipe Organ	10	Synth-Celesta

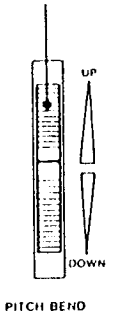
■ PITCH BENDER

The HT-6000 features a pitch bender which is fixed at a bend range of 2 whole notes.

* *The bender is in effect throughout the entire keyboard when the Casio Chord function is set to OFF.*

* *It corresponds only to keys above the split point when you choose "SPLIT", "FINGERED" or Casio Chord ("ON") modes.*

Pitch bend wheel



■ MODULATION WHEEL

The HT-6000 features a modulation wheel which is used to control the depth of modulation, when the modulation function is turned ON.

• To use the modulation wheel

(1) Turn ON the wheel by pressing the modulation ON/OFF button so that the corresponding LED lights.

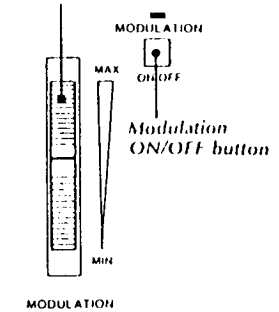
(2) To increase modulation depth, roll the wheel forward. To decrease modulation depth, roll the wheel back (toward you).

* *You can program or alter the vibrato speed and vibrato wave for each individual voice through tone editing operations.*

* *This functions turns OFF automatically whenever you change your upper tone selection.*

* *Like the pitch bender, the modulation wheel only effects upper tone sounds.*

Modulation wheel

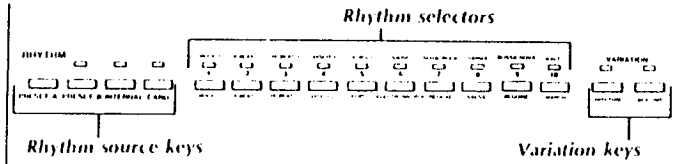


Modulation ON/OFF button

Auto-rhythms

The EII 6000's auto-rhythm function features a total of 20 PRESET rhythms, 10 INTERNAL rhythms and 30 corresponding fill-in patterns. 10 additional CARD rhythms and fill ins can be utilized through the use of an optional RAM card (RA-100).

What's more, you can add spice to auto rhythm performances by using the rhythm variation function as well as fill ins, or totally alter patterns through rhythm editing (see "Pattern Memory", page 42).

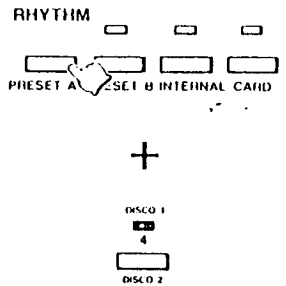


• To select an auto-rhythm

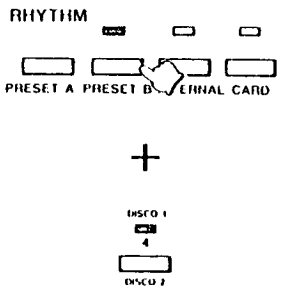
(1) Specify the rhythm source to be used by pressing any of the rhythm source keys, "PRESET A", "PRESET B", "INTERNAL" or "CARD" key (if RAM card is in use).

(2) Select a rhythm (rhythms written above the keys) by pressing one of the rhythm selectors.

In the case of "PRESET B" selection, rhythms written below the keys are selected.



• "DISCO 1" rhythm is selected



• "DISCO 2" rhythm is selected

In the case of "INTERNAL" selection, rhythms shown to the right (INTERNAL rhythms) are selected.

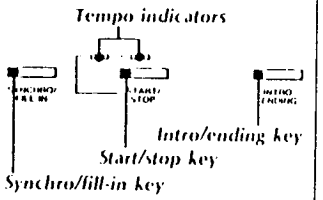
(INTERNAL rhythms)

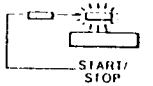
1	Rock 3
2	Rock 4
3	Funk
4	Reggae 2
5	Shuffle
6	Swing 2
7	Tango
8	Enka
9	Matsuri
10	Jazz Waltz

• To start an auto-rhythm

After selecting the desired type of rhythm, press the start/stop key.

The rhythm track starts, and the tempo indicator lights, with a red LED marking the first beat of each measure. Remaining beats in each measure are indicated by a green LED.

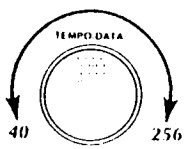


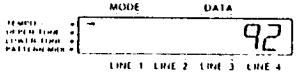


• To alter rhythm tempo

The liquid crystal display shows the tempo of the rhythm track.

To alter the tempo, simply turn the tempo/data dial right to increase tempo, and left to decrease it.
(range ♩ = 40~256)



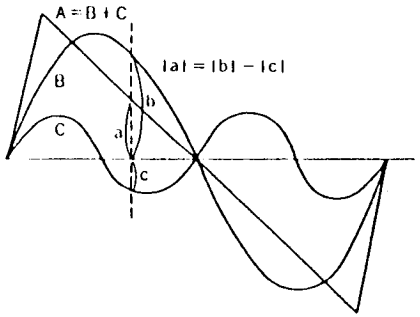


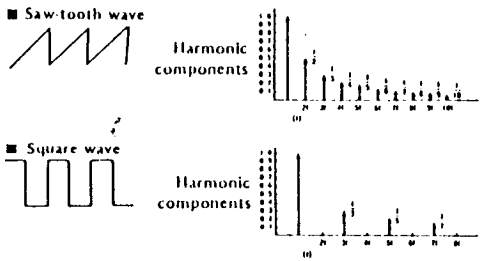
• To adjust rhythm volume

You can adjust the relative volume of the rhythm track by using the rhythm volume slider.

7 Basic Waves and Harmonics—Shaping the Timbre

Now you would probably like to know how you can determine the shape of a wave (= timbre) in order to create the kind of sound you want. Have a look at the diagram on the lower left first. It illustrates the process of combining two sine waves to form a saw-tooth wave. B is the basic sine wave while C has twice the frequency of B (it is thus one octave higher in pitch) and only half its amplitude (volume). When B and C are combined, the result is the waveform A. A is still not a perfect saw-tooth wave, but it will infinitely approach a perfect saw-tooth shape if sine waves with triple (3x), quadruple (4x), quintuple (5x) etc. frequencies are added. If, on the other hand, only sine waves with odd numbered frequency multiples are added, the basic sine wave will gradually approach a square wave.
In this manner, any waveform can be created by adding a number of sine waves to a basic sine wave. Waves such as C with frequencies that are integral multiples of the frequency of the basic wave (in our case B) are called harmonics. In other words, the waveform and thus the timbre are determined by the kind of harmonics added to the basic sine wave. Put differently, almost all sounds with their different timbres that reach our ears include a variety of different harmonics, and it is these harmonics which are responsible for the countless characteristic timbres.





*Graphs such as the ones above which show the harmonic components of a wave form are called "harmonic spectrums".

NOTES

- Music and noise

Depending on its main kind of vibrations, sound is divided into "musical" and "noise". Sounds with regular vibrations (i.e. sounds in which components other than harmonics are very few) are considered to be musical, while sounds caused by complicated irregular vibrations (i.e. sounds with many components that are not harmonics) whose pitch can therefore not be measured are noise.
Most of the sounds used in music are of course musical sounds, but various kinds of noise such as that produced by percussion instruments are also used to highten the musical effect.

- Pure Tones

Sounds which have no other components such as harmonics at all and consist of only one simple frequency are called pure tone. The wave form of a pure tone is always a perfect sine wave. The timbre of a tuning fork or the telephone time tone are almost pure tones (perfect sine waves), but a truly pure tone does not exist in the natural world. Pure tones, therefore, can only be created artificially (e.g. electronically).

Remember

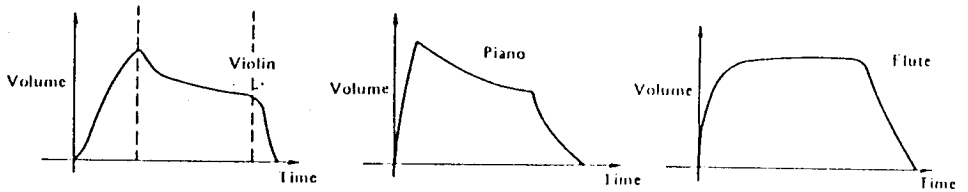
- Frequencies which are integral multiples of a basic wave with a certain frequency are called harmonics.
- The timbre (waveform) is determined by the harmonic components.

8 Envelopes

—— Other Factors Determining a Sound ——

Besides the three basic elements of sound already explained, pitch, sound volume and timbre, there is another important factor which determines a sound. This is the variation of the sound over time. More precisely, it is the variation of each of the three elements over time from the beginning of the sound up to the point in time where it disappears completely. If a violin is played with a bow, for instance, the sound volume usually increases gradually while the timbre and pitch also change slightly. These changes over time are what determines the characteristic timbre of a violin. On the other hand, if the sound of a piano were to continue without decaying, it would be very difficult to distinguish it from the the sound of a flute. These variations over time are called envelopes. Envelopes expressed graphically such as those in the diagrams below are called envelope curves.

Envelope Curves of Various Instruments (Sound Volume)



NOTE

The change of volume over time can also be called an envelope.

Remember

The changes over time of pitch, volume and timbre are called envelopes. Envelopes are among the most important factors determining a sound.

9 Basic Principles of Analog Synthesizer Structure

When people talk about synthesizers, you will often hear expressions such as VCO and VCF. Many who have heard such difficult words will therefore find it difficult to approach synthesizers, believing they are too complicated. Actually, though, synthesizers are not that difficult to understand at all.
Analog synthesizers in general consist of various blocks which correspond to the three major elements of sound and the envelopes explained above.

- **VCO (Voltage Controlled Oscillator)**

This circuit corresponds to determines the pitch of a sound by controlling voltage. This block is also used to create basic waveforms such as saw-tooth waves or square waves.

- **VCF (Voltage Controlled Filter)**

This circuit alters the timbre by accentuating or filtering out certain harmonics of the waveforms created by the VCO. The VCF might be called the most important part of an analog synthesizer.

Model HT-6000 MIDI Implementation Chart

Version : 1

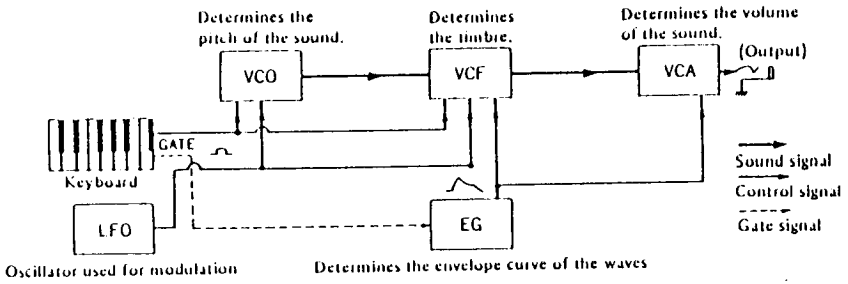
Function...		Transmitted	Recognized	Remarks
Basic	Default	1	1	Send channel = receive channel
Channel	Changed	1–12	1–12	
Mode	Default	Mode 3	Mode 3	
	Messages	×	×	
	Altered	**********		
Note Number:	True voice	36–96 **********	0–127 36–96	0–11, 12–23, 24–35 = 36–47 97–108, 109–120, 121–127 = 85–96
Velocity	Note ON	○ 9n v = 1–127	○ 9n v = 1–127	
	Note OFF	× 9n v = 0	× 9n v = 0,8n v = xx	xx...No function
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		○	○	8 significant bits
Control Change	1	○	○	Modulation wheel
	64	○	○	Sustain pedal
Prog Change:	True#	○ 0–59 (0–39) **********	○ 0–59 (0–39)	( ) → When not using RAM card.
System Exclusive		×	×	
System Common	: Song Pos	×	×	
	: Song Sel	×	×	
	: Tune	×	×	
System Real Time	: Clock	○	○	Continue not sent
	: Command	○	○	
Aux	: Local ON/OFF	×	×	
	: All Notes OFF	×	×	
Mes-sages	: Active Sense	×	×	
	: Reset	×	×	
Notes				

Mode 1: OMNI ON, POLY
Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY
Mode 4: OMNI OFF, MONO

○: Yes
× : No

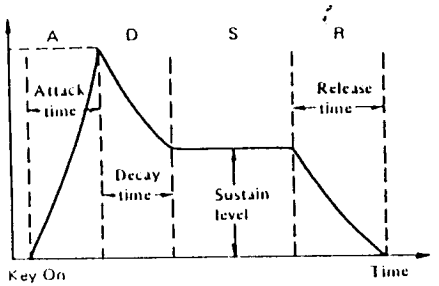
• VCA (Voltage Controlled Amplifier)

This circuit controls the volume of the sound created by the VCO and VCF.



• EG (Envelope Generator)

Controls the change over time of the volume, timbre etc.; in other words the envelopes. The basic envelope curve consists of the four elements shown in the diagram below which can be controlled independently. The EG block is thus capable of creating a great variety of curves.



• LFO (Low Frequency Oscillator)

As this term indicates, the LFO is an oscillator operating at low frequencies. It can be used to control various other blocks to create such effects as vibrato.

Remember

The basic structure and functions of an analog synthesizer:

- VCO: Determines pitch (basic waveform)
- VCF: Creates the timbre
- VCA: Determines sound volume
- EG: Determines the envelope
- LFO: Used for various effects

Note

The above is meant only as a general idea of how an analog synthesizer works. Of course, there are considerable differences according to the manufacturer and model.

CASIO HT-6000

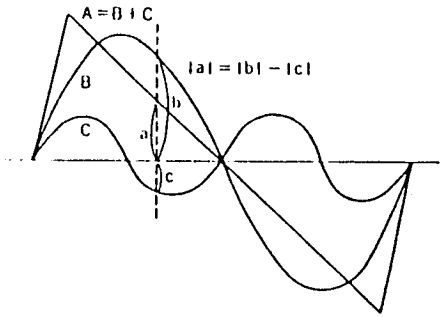
SINTETIZADOR DIGITAL PROGRAMABLE

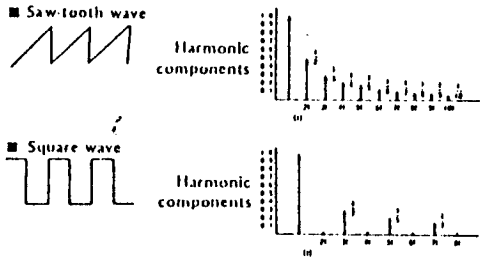
Introducción

Muchas gracias y felicitaciones por la compra del sintetizador digital Casio HT-6000. Su nuevo teclado presenta funciones y características emocionantes, y lo más avanzado en tecnología de sonido digital. Para obtener un rendimiento óptimo y asegurar confiabilidad por un largo tiempo, cerciórese de leer cuidadosamente este manual antes de utilizar este teclado.

7 Basic Waves and Harmonics—Shaping the Timbre

Now you would probably like to know how you can determine the shape of a wave (= timbre) in order to create the kind of sound you want. Have a look at the diagram on the lower left first. It illustrates the process of combining two sine waves to form a saw-tooth wave. B is the basic sine wave while C has twice the frequency of B (it is thus one octave higher in pitch) and only half its amplitude (volume). When B and C are combined, the result is the waveform A. A is still not a perfect saw-tooth wave, but it will infinitely approach a perfect saw-tooth shape if sine waves with triple (3x), quadruple (4x), quintuple (5x) etc. frequencies are added. If, on the other hand, only sine waves with odd numbered frequency multiples are added, the basic sine wave will gradually approach a square wave.
In this manner, any waveform can be created by adding a number of sine waves to a basic sine wave. Waves such as C with frequencies that are integral multiples of the frequency of the basic wave (in our case B) are called harmonics. In other words, the waveform and thus the timbre are determined by the kind of harmonics added to the basic sine wave. Put differently, almost all sounds with their different timbres that reach our ears include a variety of different harmonics, and it is these harmonics which are responsible for the countless characteristic timbres.





*Graphs such as the ones above which show the harmonic components of a wave form are called "harmonic spectrums".

NOTES

- Music and noise

Depending on its main kind of vibrations, sound is divided into "musical" and "noise". Sounds with regular vibrations (i.e. sounds in which components other than harmonics are very few) are considered to be musical, while sounds caused by complicated irregular vibrations (i.e. sounds with many components that are not harmonics) whose pitch can therefore not be measured are noise.
Most of the sounds used in music are of course musical sounds, but various kinds of noise such as that produced by percussion instruments are also used to highten the musical effect.

- Pure Tones

Sounds which have no other components such as harmonics at all and consist of only one simple frequency are called pure tone. The wave form of a pure tone is always a perfect sine wave. The timbre of a tuning fork or the telephone time tone are almost pure tones (perfect sine waves), but a truly pure tone does not exist in the natural world. Pure tones, therefore, can only be created artificially (e.g. electronically).

Remember

- Frequencies which are integral multiples of a basic wave with a certain frequency are called harmonics.
- The timbre (waveform) is determined by the harmonic components.

8 Envelopes

—— Other Factors Determining a Sound ——

Besides the three basic elements of sound already explained, pitch, sound volume and timbre, there is another important factor which determines a sound. This is the variation of the sound over time. More precisely, it is the variation of each of the three elements over time from the beginning of the sound up to the point in time where it disappears completely. If a violin is played with a bow, for instance, the sound volume usually increases gradually while the timbre and pitch also change slightly. These changes over time are what determines the characteristic timbre of a violin. On the other hand, if the sound of a piano were to continue without decaying, it would be very difficult to distinguish it from the the sound of a flute. These variations over time are called envelopes. Envelopes expressed graphically such as those in the diagrams below are called envelope curves.

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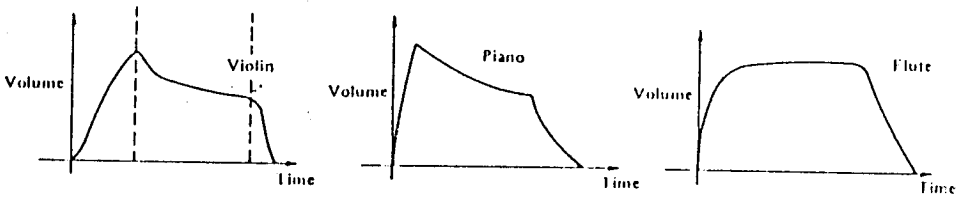

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	Altered	**********		
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		**********	36–96	
Velocity	Note ON	O 9n v = 1–127	O 9n v = 1–127	
	Note OFF	× 9n v = 0	× 9n v = 0,8n v = xx	xx...No function
After	Key's	×	×	
Touch	Ch's	×	×	
Pitch Bender		O	O	8 significant bits
Control Change	1	O	O	Modulation wheel
	64	O	O	Sustain pedal
Prog Change:	True#	O 0–59 (0–39)	O 0–59 (0–39)	( ) → When not using RAM card.
		**********		
System Exclusive		×	×	
System	: Song Pos	×	×	
	: Song Sel	×	×	
Common	: Tune	×	×	
System	: Clock	O	O	Continue not sent
Real Time	: Command	O	O	
Aux	: Local ON/OFF	×	×	
	: All Notes OFF	×	×	
Mes-	: Active Sense	×	×	
sages	: Reset	×	×	
Notes				

Mode 1: OMNI ON, POLY
Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY
Mode 4: OMNI OFF, MONO

O: Yes
× : No

• To stop an auto-rhythm

Auto-rhythm tracks can be stopped at any point by simply pressing the start/stop key once again.

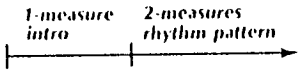
Or if you press intro/ending key while any rhythm track is playing, the rhythm track stops after an appropreate ending pattern.

• Using intro start

If the intro/ending key is pressed, the selected auto-rhythm begins after a one-measure intro pattern. This can be an effective way to lead into auto-rhythm performance.

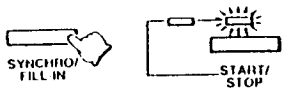
• Using synchro start

By using the synchro start function, you can cause the auto rhythm to start as soon as you play a note on the lower tone keyboard which is below the keyboard split point.

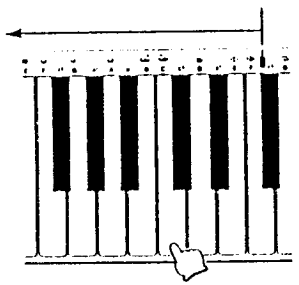


(1) After selecting the desired auto-rhythm, press the synchro/fill-in key.

* *The green tempo indicator will flash on beat, indicating that the synchro start function is in a standby mode.*



(2) The rhythm track will start as soon as you play a lower tone key on the keyboard (any key below the keyboard split point).



* *When not using keyboard split point function, you can start the rhythm track by playing any key below the last selected keyboard split point.*

• Using rhythm fill-ins

The HH-6000 features preset rhythm fill-in patterns, corresponding to the selected auto-rhythm tracks.

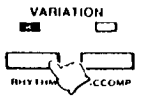
Press the synchro/fill-in key while any rhythm track is playing.

An appropriate fill-in is automatically inserted into the rhythm pattern.

If the synchro/fill-in key is held down, the fill-in pattern is repeated until the end of the measure during which the key is released.

• Choosing rhythm variations

The rhythm variation function adds extra incidental percussion sounds to basic rhythm tracks, rhythm intros, fill-ins and endings. These are all factory programmed.
To use this function, simply press the variation rhythm key so that the corresponding LED lights.



Auto-accompaniment

With most conventional keyboards, a fair degree of skill is needed to play melodies with the right hand and accompaniment patterns with the left. Not so with the HT-6000.

The HT-6000 is equipped with Casio's unique Casio Chord function. This lets you add full chord accompaniment to your melodies in either "One-Finger" or "Fingered" method, depending on your skill and preference. If you want, you can create full chords by pressing only a single key!

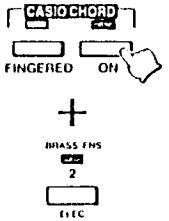
The auto-accompaniment function not only lets you decide how you want to play accompaniment chords, it automatically plays the chords in a style that matches the rhythm style you've selected. It will also add an appropriate bass line and obbligato pattern according to the rhythm you've selected.

■ USING CASIO CHORD ACCOMPANIMENT

When using the Casio Chord function you can play full three-note major chords with only a single finger.

• To select an auto-accompaniment tone

After pressing either the Casio Chord "ON" or "FINGERED" keys, select any of the lower tones (see "To select a keyboard tone," page 13).



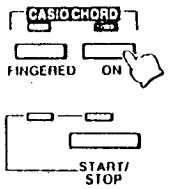
** The tone of lower tone keys in the auto-accompaniment mode are preset, and vary according to the type of rhythm selected.*

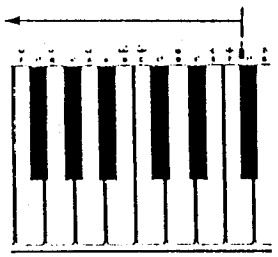
• To play Casio Chord accompaniment

(1) Press the Casio Chord "ON" key.

(2) Start the selected rhythm track in the auto-rhythm section. (Use synchro start or the intro start if you desire.)

(3) When any of the keys below the selected split point are played, a corresponding chord is sounded.





■ CASIO CHORD PATTERNS

In addition to major chords, you can play a wide variety of chords with the simplified "Casio Chord" method.

• Casio Chord Construction

When the Casio Chord function is ON, major chords are produced which have the note pressed as a root. They are automatically played in time with the rhythm pattern, together with an appropriate bass line and obbligato pattern.
In order to change the auto accompaniment to a minor chord, simply press any other key on the lower tone section of the keyboard to the right of the root key, together with the root. Pressing one more key (for a total of three) produces seventh chords, while pressing a fourth key produces minor seventh chords.

[EXAMPLES]

C (C major) .....Press ❶.
Cm (C minor) .....Press ❶ & ❷ together.
C7 (C seventh) .....Press ❶, ❷ & ❸ together.
Cm7 (C minor seventh) ...Press ❶, ❷, ❸ & ❹ together.

** Not only ❷, ❸ and ❹, but any keys to the right of ❶ on the lower tone section of the keyboard will produce the same effect, regardless of whether they are black or white keys.*

■ USING FINGERED ACCOMPANIMENT

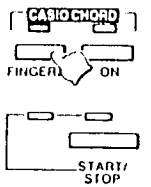
Fingered accompaniment lets you create chords yourself, by playing corresponding keys, and adds an appropriate bass and obbligato lines in correspondence with the rhythm style and type of chords played.

• To play fingered accompaniment

(1) Press the Casio Chord "FINGERED" key.

(2) Start the selected rhythm track in the auto-rhythm section. (Use synchro start or intro start if you desire.)

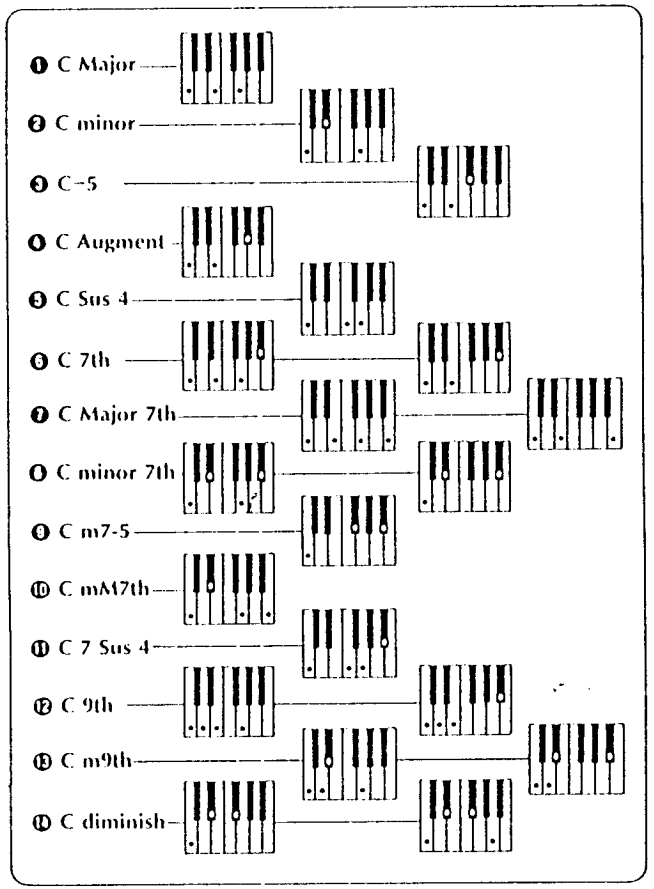
(3) Adjust the level of the accompaniment sound with the accompaniment volume slider.



** The keyboard responds to the chords you play by inserting them in the accompaniment pattern.*

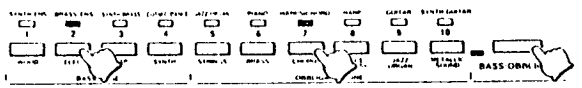
• About the chords created with fingered accompaniment

In the FINGERED mode the FH 6000 is capable of recognizing a wide range of chords. It responds to chord patterns as shown in the chart to the right.



■ BASS AND OBBLIGATO PATTERNS

When you select auto-accompaniment, bass and obbligato patterns are added to the accompaniment automatically.
The patterns and tones are preset, and vary depending on the rhythm you select. You can alter the bass and obbligato tones by pressing the bass/obbligato key.

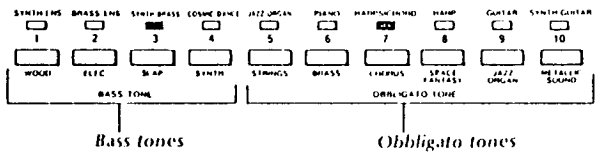


You'll notice that indicators light to show which tones are selected. The first 4 lower tones from the left are bass tones, and the remaining 6 are obbligato tones.

You're free to select other bass and obbligato tones by pressing any of the corresponding keys. To cancel the bass or obbligato tone, press the same key once again.

■ AUTO-HARMONIZE FUNCTION

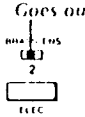
When you're using the Casio Chord function, you can add automatic harmony to your upper tone melodies by pressing the auto-harmonize key. Note that when you select this function, upper tone performance becomes monophonic.



Bass tones *Obbligato tones*

**Press once to select*

Goes out



**Press once again to cancel*

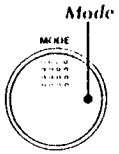
Sound Synthesis Techniques

■ ABOUT PARAMETERS & VALUES

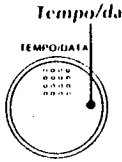
EU-6000 tones are made up of a variety of "parameters." These parameters determine the characteristics of each individual sound, including such elements as timbre, pitch and volume.
To edit or synthesize new sounds, you simply alter the "values" (numeric) of a single or multiple parameters.
When the EU-6000 stores "new" sounds, or sounds you have altered through sound editing, it is actually storing and recalling the values you have assigned to all the related parameters.
A list of these parameters and the range of values which may be set for them is shown in the parameter index on page 27.

■ EDITING & WRITING TONES

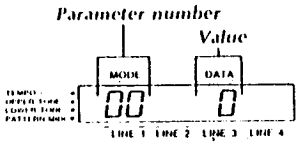
To create sounds on the EU-6000, you simply change, or "edit" preset tone parameters.
It's not necessary to start with a "blank slate" when creating a new tone. The easiest approach is to first select a factory preset tone that resembles the one you have in mind and edit that sound until you get the sound you want.



* *The mode dial is used to select parameter numbers.*



* *The tempo/data dial is used to input a value for the selected parameter.*



* *Parameter numbers are displayed in the MODE position on the LCD display.*
* *Values are displayed in the DATA position.*

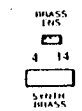
■ TONE EDITING

EU-6000 tones can be edited by altering the values of their parameters. This process is known as "TONE EDITING".

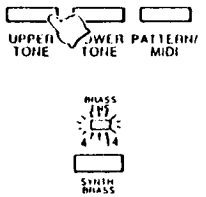
● To edit tones

①Select the tone to be edited.

* *Note that both upper and lower tones may be edited.*

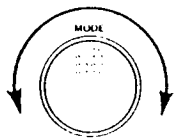


②Press the UPPER TONE key (or the LOWER TONE key) of the program keys.



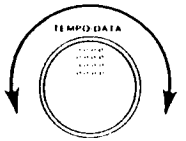
* *The selected tone indicator flashes.*

③Turn the mode dial to select the number of the parameter to be edited. (Refer to ≪Parameter Index≫ on page 27.)



④Turn the tempo/data dial to alter the value of the selected parameter.

* *Refer to ≪Parameter Index≫ for information on specific range of each parameter.*

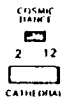


⑤Press the WRITE key.

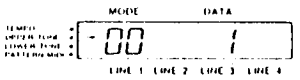
* *Internal key indicator lights.*

⑥Press the tone selector to which the edited value is to be assigned.

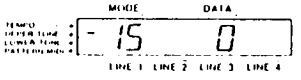
The WRITE key indicator goes out and the display returns to the normal performance mode (as opposed to editing mode), showing the tempo.

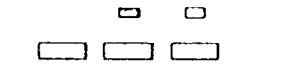


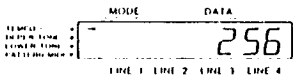
* *The edited tone is now written into the internal memory. You can select it at any time by simply pressing the internal upper tone source key and the tone selector to which you assigned the sound.*



* *When one of the program keys is pressed, the LCD display shows the parameter and the value corresponding to the mode dial setting.*







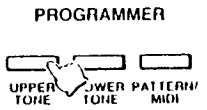
■ COMPARE FUNCTION

The compare function lets you "compare" the sound you've created through editing with original preset sounds.

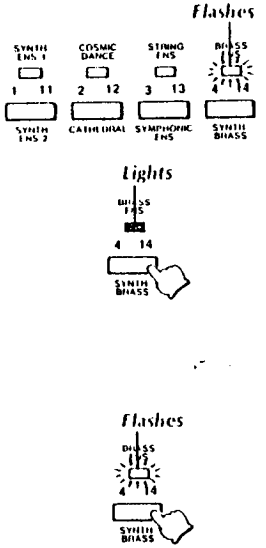
• To compare sounds during editing

You'll notice that the indicator above the selected tone flashes after you enter the editing mode.

After you've begun editing the sound, you may want to hear how it sounded in its original form.



To return temporarily to the initialized form, simply press the tone selector whose indicator is flashing.
The indicator stops flashing, and the original tone sounds on the keyboard.



To reenter the editing mode, simply press the tone selector once again.
The indicator begins flashing again, and the edited tone sounds on the keyboard.

** The LCD display shows the edited value - even when comparing the original sound.*

≪PARAMETER INDEX≫

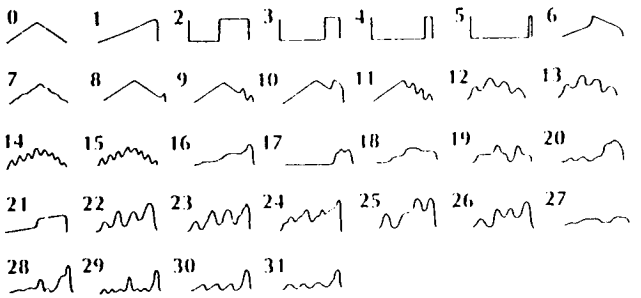
■ DCO/LFO Parameters

00/01 DCO WAVEFORMS

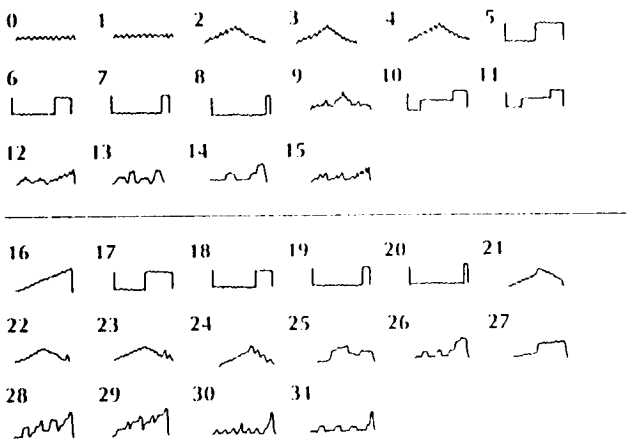
The choice of waveforms will have more effect on the tonal characteristics (timbre) of the sound than will any other parameters.

Practically speaking, DCO waveforms determine the basic instrument "family" which the sound corresponds to.

<WAVE FORMS (MODE No. 00)>



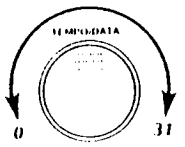
<WAVE FORMS (MODE No. 01)>



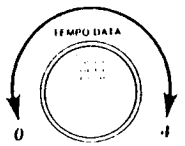
** When setting Parameter "01", waveforms (values) "16" through "31" can only be selected for upper tones.*

** Parameter "01" waveforms number "0" through "15" contain noise, while waveforms "16" through "31" feature ring modulation.*

02 VIBRATO DEPTH
Determines the depth of LFO modulation. This modulation is used in creating vibrato effects.
When set at "0", no vibrato is effected. As the value is incremented, the depth (strength) of the vibrato is increased.

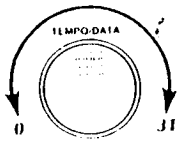


03 VIBRATO WAVE
Determines the type of basic waveforms used in vibrato effects.

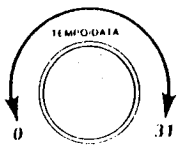


Data No. "0".....
"1".....
"2".....
"3".....
"4".....RANDOM

04 VIBRATO DELAY TIME
Determines the length of delay following key depression prior to the onset of vibrato effects.
When set at "0", vibrato begins immediately after key is depressed. As the value is incremented the delay time is increased.



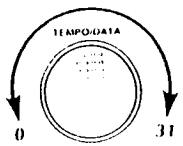
05 VIBRATO RATE
Determines the speed of vibrato.
When set at "0", vibrato oscillates at the slowest rate. As the value is incremented, the speed of the vibrato is increased.

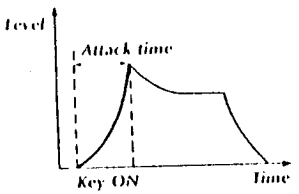


** Before setting the vibrato parameters (parameter 02 through 05), be sure to switch the Modulation ON/OFF button off.*

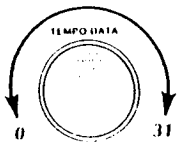
■ VCF Parameters

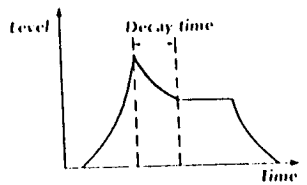
10 VCF ATTACK TIME
Determines how long it takes for the VCF envelope to rise from zero to its maximum level after a key is depressed.



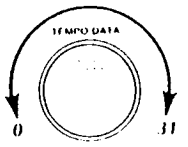


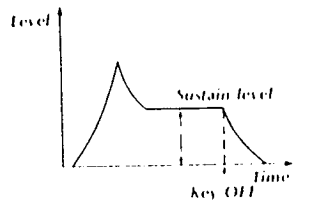
11 VCF DECAY TIME
Determines how long it takes for the envelope to fall from the maximum contour level to the sustain level.



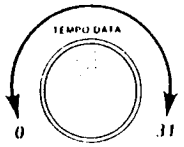


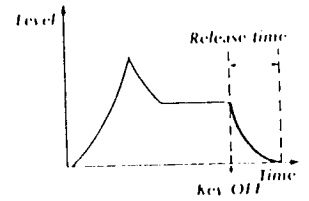
12 VCF SUSTAIN LEVEL
The level to which the sound's VCF envelope decays, assuming that the note is still being played on the keyboard.



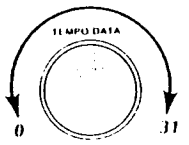


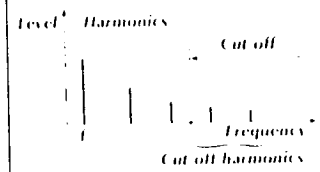
13 VCF RELEASE TIME
Release time is the period that it takes for the VCF envelope to fall away from the sustain level to the minimum level after the note has been released.



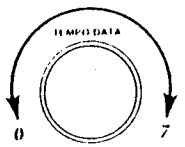


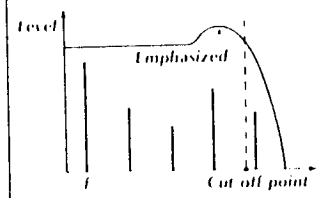
14 CUTOFF FREQUENCY
Determines the cutoff frequency of the low-pass filter.
The higher the cutoff frequency, the less effect the filters have on the basic waveforms (as more harmonics are passed).
At the highest value, all harmonics are passed. As the value becomes lower, more harmonics are cut off so that the sound becomes progressively "rounder," or less bright.



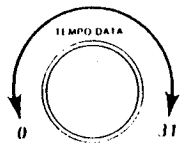


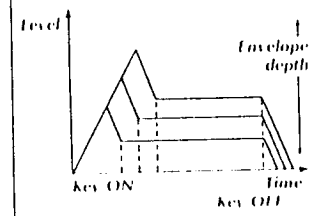
15 RESONANCE
Emphasizes harmonics near the cutoff frequency, producing a peaky or bandpass type of sound.
The higher the value, the higher the resonance peak and the more obvious the effect.





16 ENVELOPE DEPTH
Determines the amount of effect that the VCF has on the overall sound.

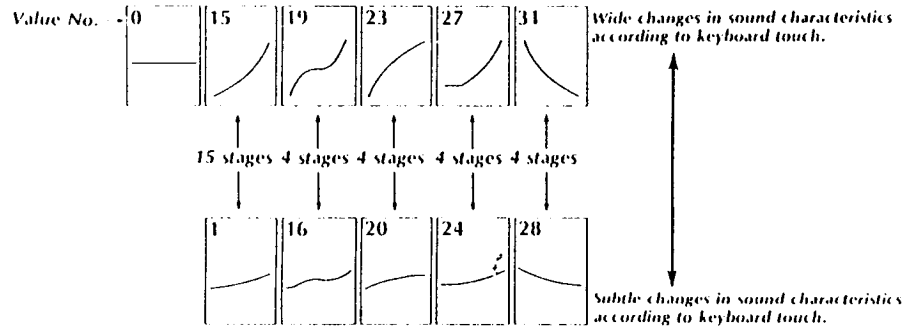




17 VELOCITY

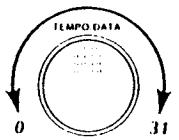
Velocity settings determine the type of velocity curve which the VCF envelope follows, according to the speed of initial touch (how quickly the key is depressed).

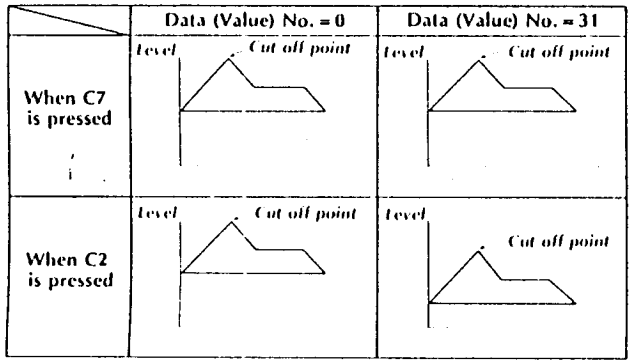
<Standard Velocity Curves>



18 KEY FOLLOW

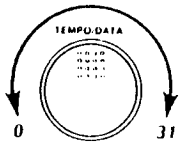
Used to alter the VCF cutoff point according to the pitch of the key played on the keyboard.
At a setting of "0", key follow is off. As the value is raised, the lower the key on the keyboard is, the lower the cut off point.

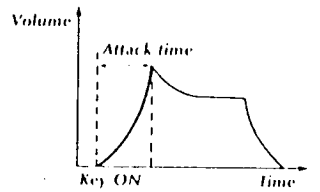




20 DCA ATTACK TIME

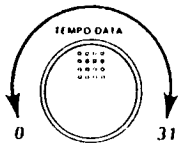
Determines how long it takes for the DCA output voltage to rise from zero to its maximum level.
Essentially, attack determines the "quickness" at which a sound reaches its maximum volume after a note is played on the keyboard.

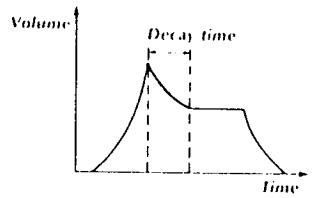




21 DCA DECAY TIME

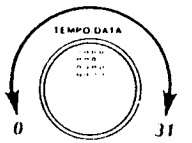
Determines the period that it takes for the DCA envelope to fall from the maximum contour level to the sustain level.

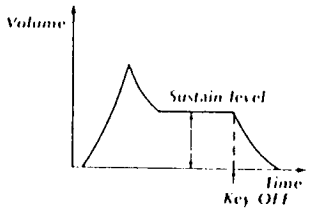




22 DCA SUSTAIN LEVEL

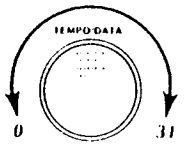
Determines the voltage level to which the DCA envelope decays, assuming that the key is still being held down on the keyboard.

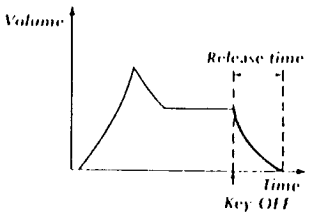




23 DCA RELEASE TIME

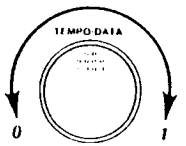
Determines the period that it takes for the DCA envelope to fall away from the sustain level to its minimum level after the key has been released.

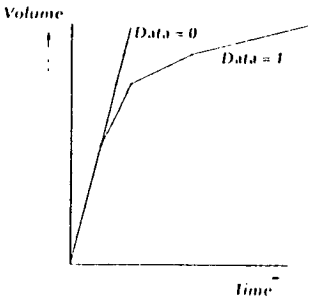




24 ATTACK CURVE

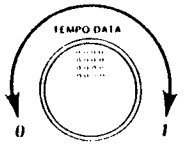
Determines the curve of the DCA envelope attack over time.
A value of "0" provides a quick attack as the curve is rather acute, while a setting of "1" provides a sloping curve for a slower attack which is useful in creating brass sounds, etc.

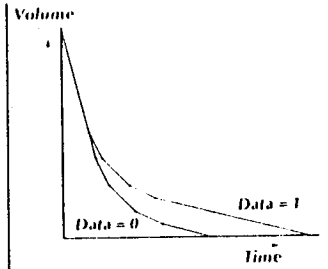




25 DECAY CURVE

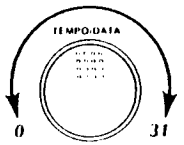
Determines the curve of decay for the DCA envelope. A value of "0" provides a quick decay as the curve is rather acute, while a setting of "1" provides a sloping curve for a slower decay.





26 DCA KEY FOLLOW

Used to alter the decay time of the DCA envelope according to the position of the key on the keyboard. At a setting of "0", the key follow effect is off. As the value is increased, the lower the key is on the keyboard the longer the decay time.



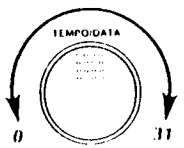
	Data (Value) No. = 0	Data (Value) No. = 31
When C6 is pressed	Volume / Time	Volume / Time
When C2 is pressed	Volume / Time	Volume / Time

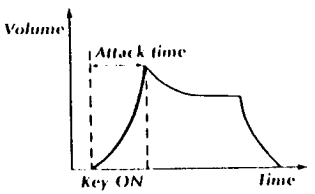
■Noise parameters

Noise related parameters may be set independently for waveforms containing noise.

27 NOISE ATTACK TIME

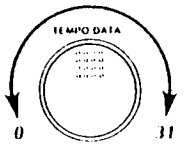
Determines how long it takes for noise envelope to reach its maximum level after a key is pressed.

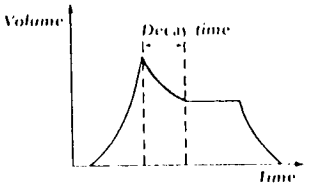




28 NOISE DECAY TIME

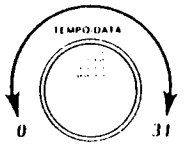
Determines the period that it takes for the noise envelope to fall from the maximum level to the sustain level.

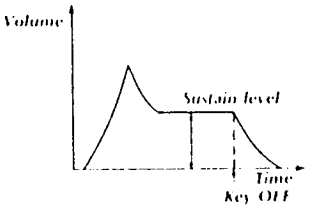




29 NOISE SUSTAIN LEVEL

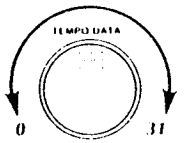
Determines the level to which the noise envelope decays, assuming that the key is still being held down on the keyboard.

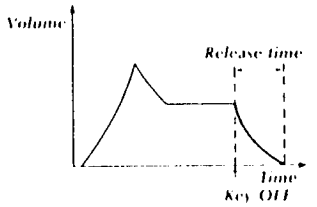




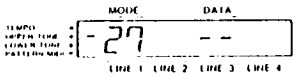
30 NOISE RELEASE TIME

Determines the period that it takes for the noise envelope to fall away from the sustain level to its minimum level after the key has been released.

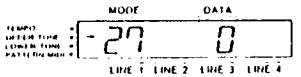




* *When the selected waveform does not contain noise, the display appears as shown at the right for parameters "27" through "30".*



* *If you change from a waveform which does not contain noise to one which does contain noise, the values for parameters "27" through "30" are all initialized at "0".*

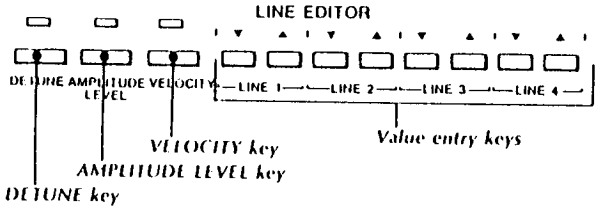


■ LINE EDITING

Line editing allows you to detune and adjust volume and velocity levels for each of the EH 6000's four oscillators.

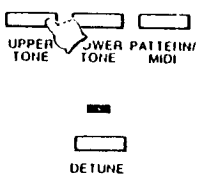
For example, you can create voices with 4-stage dynamic control by making relative adjustments of velocity and amplitude values for each oscillator. And the overall sound can be made "fatter" through detuning effects. You can even create voices with ring modulation or chorus effects.

If you're already familiar with analog style synthesizers, you'll find line editing very easy to understand. If you're not, you'll want to experiment with it to get the most out of each individual sound.



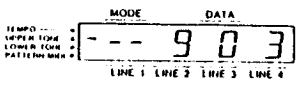
• To detune

(1) Press the UPPER TONE or LOWER TONE key of the program keys (depending on which tone you intend to line edit).

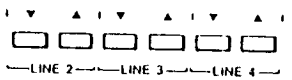


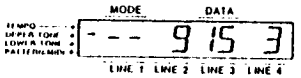
(2) Press the DETUNE key.

** Detuning of LINEs 2 through 4 is carried out in comparison with the tuning of LINE 1. Because of this, no value is shown for LINE 1 (it's value is equal to "0").*

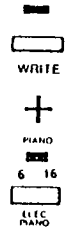


(3) Detune LINEs 2 through 4 by pressing the value entry keys.

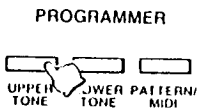




(4) If you want to write detuning to memory, press the WRITE key and then press the tone selector to which you want to write the detuned sound. Operation automatically returns to the performance mode.



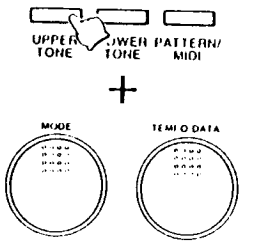
(5) If you don't want to write detuning to memory, press the UPPER TONE or LOWER TONE key twice to return to the performance mode, or press either the AMPLITUDE LEVEL key or VELOCITY key to continue line editing.



• To create ring modulation through detuning

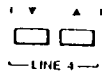
When line editing upper tone sounds, ring modulation effects can be created.

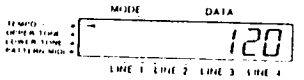
(1) Press the UPPER TONE key, and select mode "01" and a data (waveform) value between "16" and "31" using the mode and tempo/data dials.

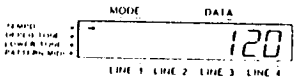


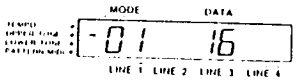
(2) Press the DETUNE key.

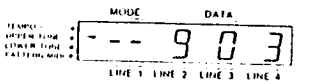
(3) Set LINE 4 to adjust the depth of ring modulation, using the value entry keys.

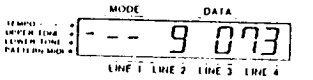










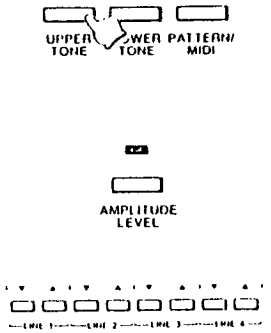


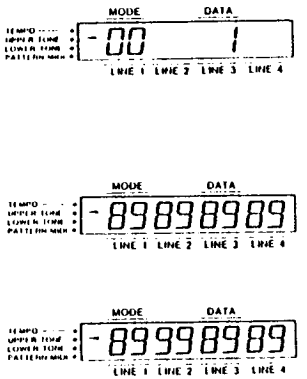
• To edit line amplitude levels

(1) Press the UPPER TONE or LOWER TONE key of the program keys (depending on the voice you want to edit).

(2) Press the AMPLITUDE LEVEL key.

(3) Raise or lower amplitude levels using the value entry keys.





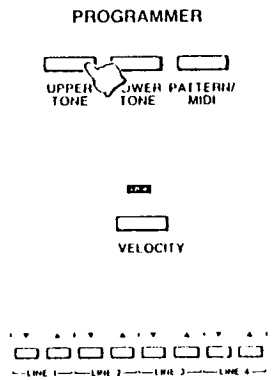
• To edit line velocity levels

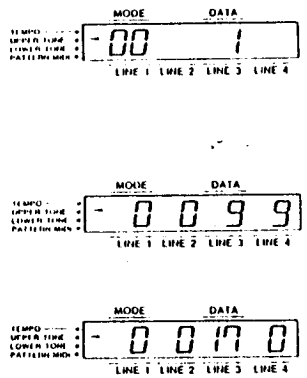
(1) Press the UPPER TONE or LOWER TONE key of the program keys (depending on the voice you want to edit).

(2) Press the VELOCITY key.

(3) Raise or lower velocity levels using the value entry keys.

** The second place decimal (10's digit) determines the velocity curve and the first place decimal determines the velocity levels.*





■ SOUND SYNTHESIS PRACTICE EXERCISE

If you're new to sound synthesis, this exercise will help you become familiar with how changing parameter values (tone editing) and using the line editor to detune or alter relative oscillator levels can change the basic characteristics of a sound.
In this example, we'll start with internal tone number 18—the "CLARINET" tone—as a basic sound to work from.
First, we'll alter the clarinet sound to make an "organ" sound;

(1) Select INTERNAL tone number "18". (CLARINET)

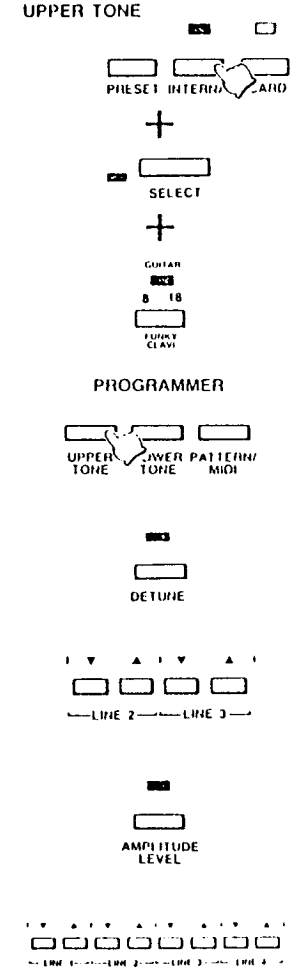
(2) Press the UPPER TONE key.

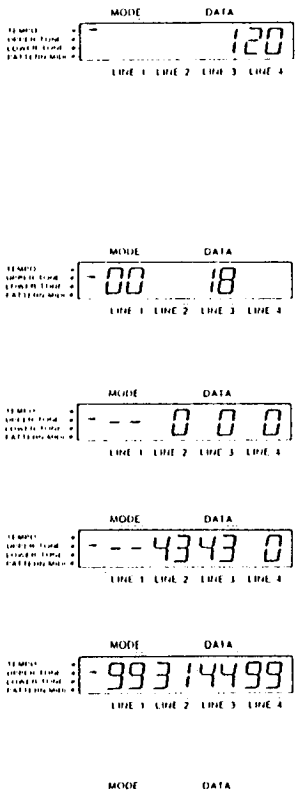
(3) Press the DETUNE key.

(4) Set line 2 and 3 detune level to "43" by pressing the value entry key.

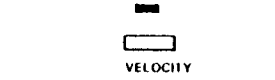
(5) Press the AMPLITUDE LEVEL key.

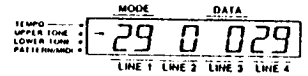
(6) Adjust the amplitude level of all 4 lines to "77" by pressing the value entry keys.



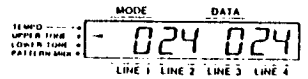


(7) Press the VELOCITY key.

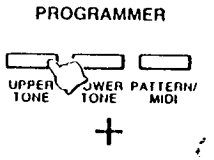


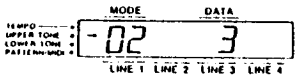


(8) Pedal organs feature some degree of keyboard touch, so set velocity values of "24" to lines 2 and 4 by pressing the value entry keys. Velocity for lines 1 and 3 should be set at "0"

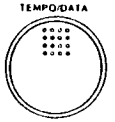


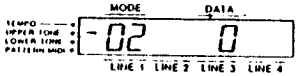
(9) Press the UPPER TONE key, and set the parameter to "02" using mode dial.





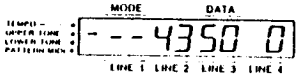
(10) Set the value to "0" using tempo/data dial to remove vibrato from the tone.



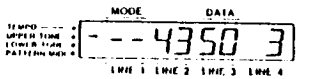


Now we'll use this new sound as a basis to create a "bagpipe" sound;

(11) Press the DETUNE key and raise the tuning of line 3 to a value of "50".



(12) To simulate the sound of many instruments playing at the same time, set line 4 to a value of "3".

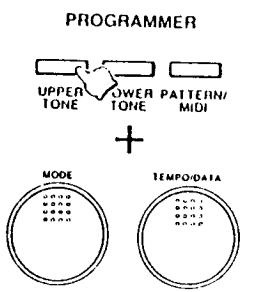


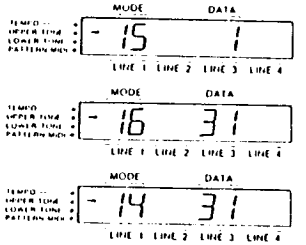
(13) Press the UPPER TONE key, and set VCF characteristics with the following values.

Parameter 15: set resonance to a value of "1".

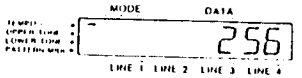
Parameter 16: set envelope depth to a value of "31".

Parameter 14: set cutoff frequency at a value of "31".



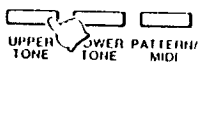


(14) Press the WRITE key, and store this bagpipe tone into the memory by pressing one of the upper tone selectors.



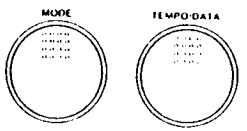
Next, we'll use the bagpipe sound as a starting point to create a "synth clavi" sound;

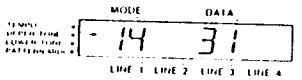
(15) Press the UPPER TONE key.

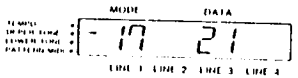


(16) First, make wide alterations in VCF characteristics to approximate a synth clavi sound;

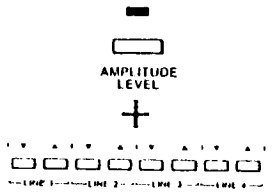
Parameter 10: 0
Parameter 11: 30
Parameter 13: 27
Parameter 14: 12
Parameter 15: 7
Parameter 17: 21

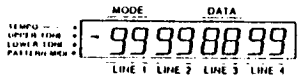




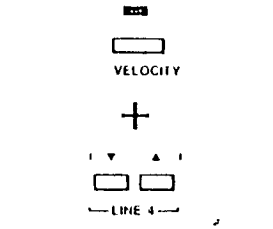


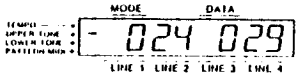
(17) Press the AMPLITUDE LEVEL key. By increasing resonance depth we have decreased overall volume, so increase line levels to values of "99-99-88-99".





(18) Press the VELOCITY key. To set velocity so that the harder the key is played, the more apparent the line for detuning effect becomes, set line 4 velocity at a value of "29".

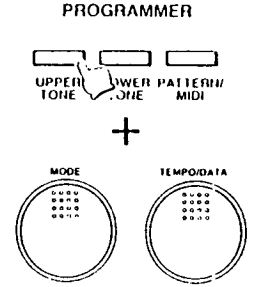


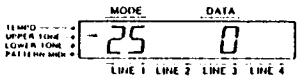


Finally, we'll use the synth clavi sound to create a "harp" sound;

(19) Press the UPPER TONE key. Alter DCA envelope characteristics;

Parameter 15: 0
Parameter 16: 28
Parameter 20: 5
Parameter 21: 26
Parameter 22: 0
Parameter 23: 23
Parameter 24: 0
Parameter 25: 0

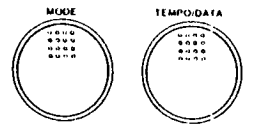


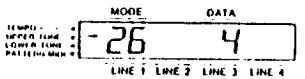


(20) Add key follow specifications;

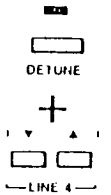
Parameter 18 (VCF key follow): 11

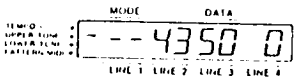
Parameter 26 (DCA key follow): 4



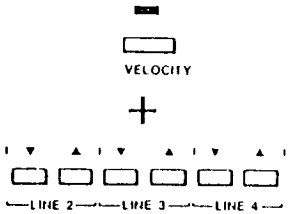


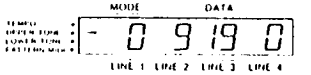
(21) Press the DETUNE key. To make the sound clearer, remove the detuning of line 4 by setting its value back to "0".





(22) Press the VELOCITY key. Finally, add a Harp-like velocity curve by setting velocity at "0-9-19-0", with touch affecting only the second and third harmonics.





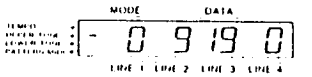
(23) Let's compare the two tones, "bagpipe" and "harp", using the compare function. Play the harp tone, and then compare the sound with bagpipe by recalling the tone by pressing the flashing tone selector.

Flashes

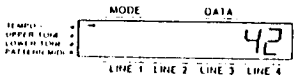
**HARP sound*

Lights

**BAGPIPE sound*



(24) Press the WRITE key, and store this harp tone into the memory by pressing one of the upper tone selectors.



Pattern Memory

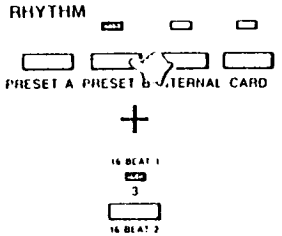
The EII 6000 features a PATTERN MEMORY, which is capable of storing 10 different patterns of up to 2 measures each. These patterns may consist of rhythms, bass lines and accompanying chords. In addition, a one measure fill-in may be programmed corresponding to each 2-measure pattern. Programming of these patterns is very similar to editing procedures, as the mode and tempo/data dials are used. You can practice your pattern until you perfect it. Your pattern will not be stored into the memory unless you press the WRITE key.

■ PROGRAMMING RHYTHM PATTERNS

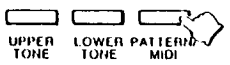
It's probably easiest to start your programming with the rhythm track. You can practice and edit the pattern until you get it right, then write it to either the INTERNAL or CARD memories.

● To program rhythm pattern

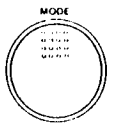
(1) Select the PRESET, INTERNAL or CARD rhythm which is closest to the type you want to program.

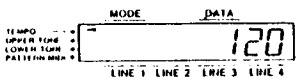


(2) Press the PATTERN/MIDI key.



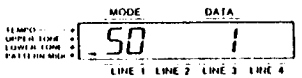
(3) Turn the mode dial to select parameter "00", corresponding to rhythm pattern programming.

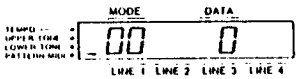




When either PRESET A or PRESET B rhythm is selected for programming, the entire bass and chord tracks are automatically erased.

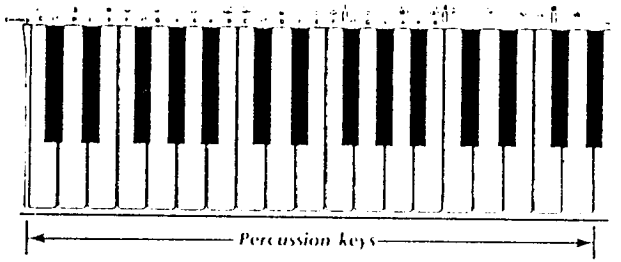
*Adjust rhythm tempo.





(4) Press the start/stop key to program 2-measure patterns, or the synchro/fill-in key to program 1-measure fill-ins.

You can practice your rhythm skills in this practice mode. Simply tap the percussion keys in time with the rhythm pattern.

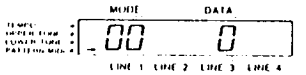


(5) When you want to write new patterns to memory, press the WRITE key.

You can now alter the basic rhythm pattern by either adding new percussion sounds directly, or first deleting any or all of the sounds by using the delete function.

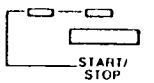
For details on how to delete percussion sounds, see page 44.

Lights



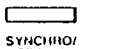
(6) When you're satisfied with the rhythm pattern, stop the rhythm by pressing the start/stop key.

*LED flashes.



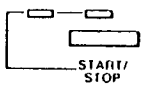
Flashes

(7) If you want to continue recording a corresponding fill-in pattern, press the synchro/fill-in key and program the pattern in the same way you edited the main rhythm pattern.



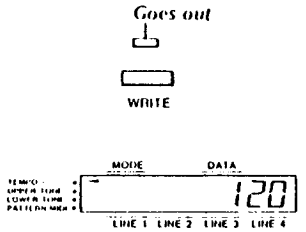
(8) When you are satisfied with the rhythm and fill-in patterns, press the start/stop key to stop the auto-rhythm.

*LED flashes.



⑨Press the auto-rhythm selector to which the patterns will be assigned in the internal memory.

Your rhythm pattern is now held in the internal memory. To choose it, simply press the selector to which you assigned it, after selecting the internal source.

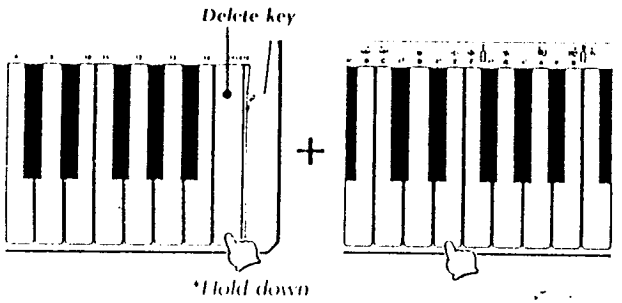


• To delete specific instrument sounds from a rhythm pattern

After pressing the WRITE key during rhythm pattern programming, hold down the DELETE key (C6) and press the keyboard key corresponding to the instrument you want to delete from the pattern.

The instrument sound will be deleted from the pattern for as long as you hold both keys down.

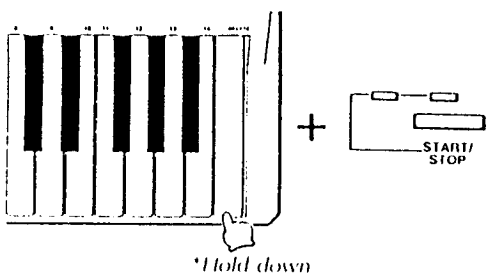
You'll find this handy when inputting new sounds as well, as you can delete and reprogram any sounds when you make a mistake in input.



• To delete an entire pattern

After pressing the WRITE key during rhythm pattern programming, hold down the delete key before pressing the start/stop key in the rhythm programming procedure.

By deleting the whole pattern, you can create entirely new rhythms from "scratch."



You need only delete the 2-bar rhythm pattern, as corresponding fill-in patterns are deleted automatically at this time.

** If you want to return to the performance mode while programming a pattern, simply press the PATTERN/MIDI key once again.*

■ PROGRAMMING BASS PATTERNS

The next step in building a pattern is programming a bass pattern. This is done by playing a simple bass line on the bass keys between G2 and C4. The bass timbre is that which was selected before you entered the pattern programming mode.

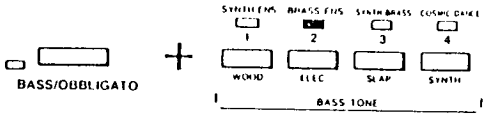
①Select the PRESET, INTERNAL or CARD rhythm which you want to program.

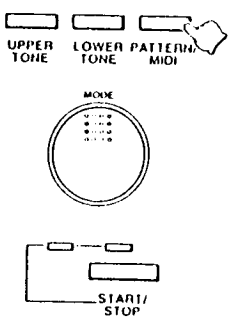
②Press the PATTERN/MIDI key.

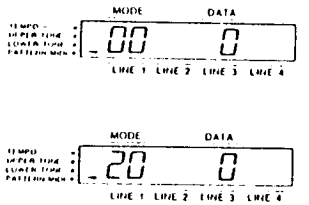
③Turn the mode dial to select parameter "20", corresponding to bass pattern programming.

④Press the start/stop key to program 2-measure patterns, or the synchro/fill-in key to program 1-measure fill-ins.

⑤When you want to write new patterns, press the WRITE key.

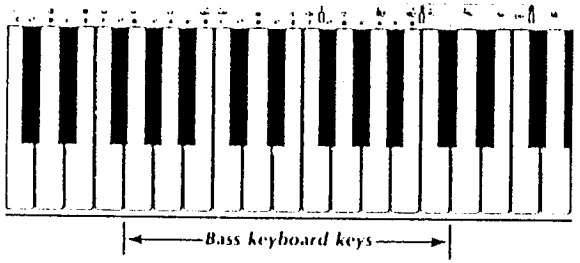






You can now alter the basic bass pattern by either adding new notes sounds directly, or first deleting any or all of the notes by using the delete function.

To input the bass pattern, play the pattern on any keys between G2 and C4.



In the pattern program mode, bass patterns and chord patterns are registered in C-major. When you are back in the performance mode and play the pattern you programmed, the key of auto-accompaniment is automatically transposed corresponding to the chord you play on the accompaniment keyboard.

For details on how to delete bass sounds, see page 47.

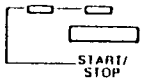
⑥ When you're satisfied with the bass pattern, stop the rhythm by pressing the start/stop key.
*LED flashes.

Flashes

⑦ If you want to continue recording a corresponding fill in pattern, press the synchro/fill in key and program the pattern in the same way you input the main bass pattern.

Lights

⑧ When you are satisfied with the bass and bass fill-in patterns, press the start/stop key to stop the auto-rhythm.
*LED flashes.

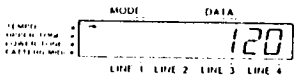


Flashes

⑨ Press the auto-rhythm selector to which the patterns will be assigned.

Your bass pattern is now held in memory, assigned to the auto-rhythm which you selected.

Goes out



● To delete an entire bass pattern

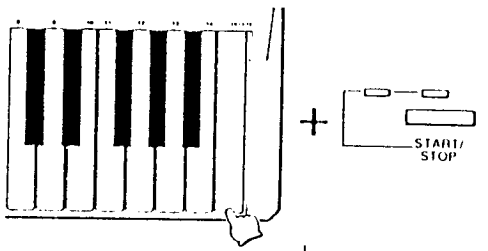
When either PRESET A or PRESET B rhythm is selected for programming, the entire bass track is automatically erased.
However if INTERNAL or CARD rhythms are selected, the pattern may be deleted by the following procedure.

① Hold down the delete key before pressing the start/stop key in the programming procedure.

By deleting the whole pattern, you can create entirely new bass lines from "scratch."

You need only delete the 2-bar rhythm pattern, as corresponding fill-in patterns are deleted automatically at this time.

If you want to return to the performance mode while programming a pattern, simply press the PATTERN/MIDI key once again.



*Hold down

■ PROGRAMMING CHORD PATTERNS

You can complete your pattern program by programming the accompanying chords.

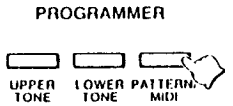
Programming these chords is easy, as all you have to do is play the CHORD INVERSION keys (1 through 14) to input full chords.

What's more, you can program chord dynamics according to the velocity at which you play the CHORD INVERSION keys. Play them with a fast attack to accent the chord.

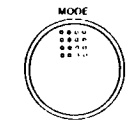
● To program chord patterns

(1) Select the lower tone which you want to use for the chord pattern.

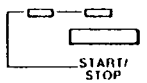
(2) Press the PATTERN/MIDI key.



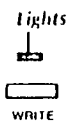
(3) Turn the mode dial to select parameter "10", corresponding to chord pattern programming.

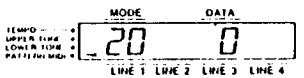


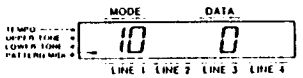
(4) Press the start/stop key to program 2-measure patterns, or the synchro/fill-in key to program 1-measure fill-ins.



(5) When you want to write new patterns, press the WRITE key.

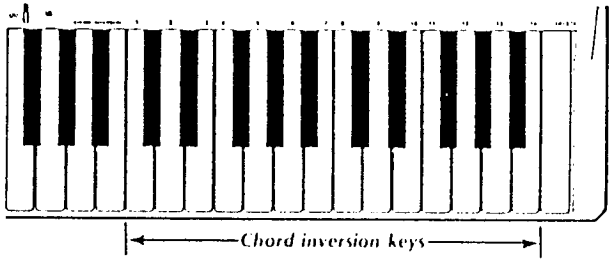






You can now alter the basic chord pattern by either adding new chords sounds directly, or first deleting any or all of the notes by using the delete function.

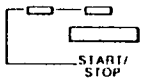
To input the chord pattern, play the chords on any of the CHORD INVERSION keys located between C4 and B5.



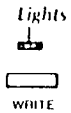
** For details on how to delete chord pattern, see page 47. (The same operation as "to delete an entire bass pattern".)*

** Note that the tempo indicators act as a metronome. If you make a mistake in input, use the delete key to erase the mistaken or unnecessary part and play it over again.*

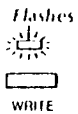
⑥ When you're satisfied with the chord pattern, stop the rhythm by pressing the start/stop key.
** LED flashes.*



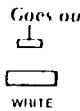
⑦ If you want to continue recording a corresponding fill-in pattern, press the synchro/fill-in key and program the pattern in the same way you input the main chord pattern.



⑧ When you are satisfied with the chord and chord fill-in patterns, press the start/stop key to stop the auto-rhythm.
** LED flashes.*



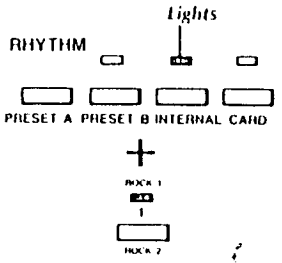
⑨ Press the auto-rhythm selector to which the patterns will be assigned.
Your chord pattern is now held in memory, assigned to the auto-rhythm which you selected.



• To play programmed patterns

Now that your pattern is complete, you can "play" it by playing Casio Chord progressions on the lower tone section of the keyboard, and playing original melodies on the upper tone keys.

(1) Press the auto-rhythm selector corresponding to the program you want to play back.



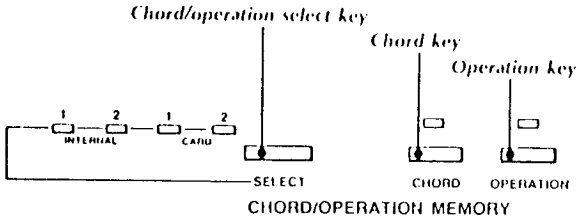
·2 Press the start/stop key (or intro/ending, synchro/fill-in keys).

The programmed rhythm track will start.

The bass line and chord accompaniment begins when any lower tone key on the keyboard is played. Bass lines automatically follow the progression of chord changes at any point in the pattern.

Chord/Operation Memory

The HT-6000 Chord/Operation Memory function holds 2 complete songs, each containing up to 427 chords, and up to 197 operations. ("operations" refer to such things as changes in rhythm and tone, Casio Chord specifications, auto-harmonize ON/OFF settings, fill-ins and endings.)
In addition, these songs may be written directly to a RAM card, or dumped onto a RAM card from the internal memory and recalled via SAVE/LOAD operations.*
(see page 54, "To save or load data.)

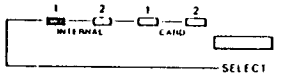


CHORD/OPERATION MEMORY

• To program chord/operation memory

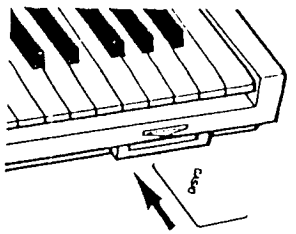
The chord/operation memory is actually composed of 2 separate memories, a chord memory and an operation memory, however programming operations are the same for each.

(1) Select the track (INTERNAL 1, 2 or CARD 1, 2) to be programmed.

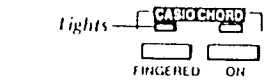


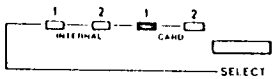
If you're going to record the chord or operation program in the internal memory, remove the RAM card. The select key can then be used to choose either INTERNAL track 1 or track 2.

To record on a RAM card track, simply insert the card and press the selector to choose either CARD track 1 or track 2.

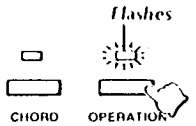


*Do not insert or remove RAM card while the power switch is turned on.

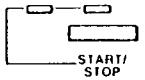




(2) Press either the CHORD or OPERATION selector to specify which type of program you're going to enter into memory.



(3) Press the start/stop key to begin rhythm track (you can also use the synchro function).
The rhythm track starts after a one-measure count. When synchro start is set, the rhythm track starts immediately after any key below the selected keyboard split point is pressed.

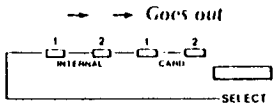


In this status, programming has already begun. Program chord or operation memory via real time operation, playing chords via Casio Chord, or performing desired operations.

You can clear former contents from the memory by pressing the start/stop key once again during the one-measure intro count.

(4) Press start/stop key or ending key to end programming.

(5) Press the select key as necessary to exit from the chord/operation programming mode.



When memory capacity is exceeded, rhythm stops and 2 LEDs above start/stop key light together. Press the start/stop key to exit from this state.

RAM Card

An optional RAM Card can be utilized with the EH-6000 to increase its memory potential. This card features 8K bytes of memory capacity, which lets you store a wide range of sound data.

■ RAM CARD MEMORY CAPACITY

1. Upper tones 20
2. Lower tones 10
3. Rhythm patterns 10
4. Rhythm fill-ins 10
5. Chord patterns 10
6. Chord fill-ins 10
7. Bass patterns 10
8. Bass fill-ins 10
9. Operation memory (197 operations) 2
10. Chord progressions (427 chords) 2

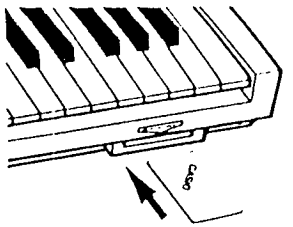
■ FORMATTING THE RAM CARD

Before using a RAM card for the first time, you'll need to format the card via the following procedures.

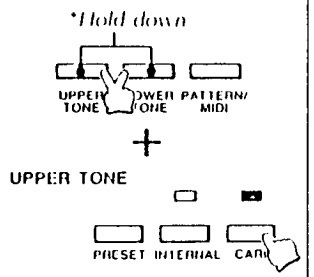
● To format the RAM card

① Insert the RAM card into the RAM card slot.

** Do not insert or remove the RAM card while the power switch is turned on.*

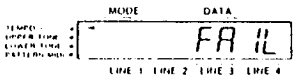


② Hold down the UPPER TONE and LOWER TONE keys, and press the upper tone CARD key.



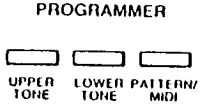
** When an improper card is inserted, a failure message on the display indicates an error.*

** Do not remove the card while formatting, or during save or load operations.*

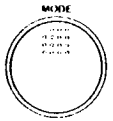


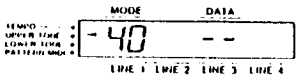
• To save or load data

(1) With the RAM card in place, press the program keys corresponding to the type of data to be saved or loaded.



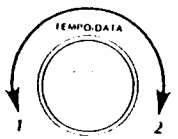
(2) Turn the mode dial to parameter number "40".

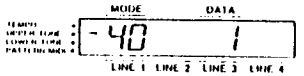




** When making pattern/ MIDI selection, parameter "40" corresponds to saving or loading of chord/ operation memory data. If you want to save or load pattern memory data, select parameter "10", "20" or "30".*

(3) Turn the tempo/data dial to enter a value of "1" for save operations or "2" for load operations.

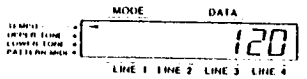




** If you want to cancel this save/load stand-by mode, or to enter another mode such as tone editing mode, be sure to press the program key you selected initially and return to the normal performance mode first.*

4 Press the WRITE key.

The write indicator flashes three times indicating that the data has been transferred to or from the RAM card. Operations then automatically return to the performance mode.

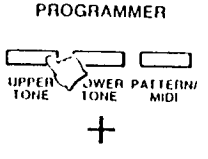


Key Transpose

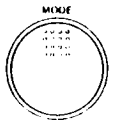
The key transpose function allows you to raise or lower the key of the entire keyboard, in half-step increments.

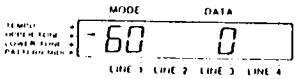
• To transpose key

(1) Press the UPPER TONE key.

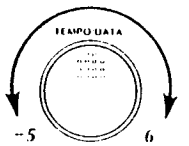


(2) Turn the mode dial so that display shows parameter "60."

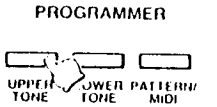


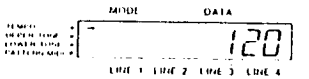


(3) Turn the tempo/data dial to transpose pitch. You can raise or lower the pitch by a total of 5 half-steps (in half-step increments), by turning the dial left or right.



(4) Press the UPPER TONE key once again to return to the performance mode.





MIDI

"MIDI" stands for "Musical Instrument Digital Interface". Practically speaking, it lets you connect the EH-6000 to other MIDI-equipped musical instruments and devices, such as synthesizers, drum machines, sequencers, and even personal computers.

The EH-6000 features 4 basic MIDI modes:

(MIDI mode A)
Sends/Receives MIDI messages as a single keyboard (8 note poly).

(MIDI mode B)
Sends/Receives MIDI messages for upper and lower halves of keyboard (4 note poly per half).

(MIDI mode C)
Splits keyboard into 3 sections, a 4-note poly section, a 3-note poly section and a mono section for use as a multiple sound source.

(MIDI mode D)
Sends multiple MIDI messages for both accompaniment pattern and melody performance (for use as a backing sequencer).

■ SETTING THE MIDI CHANNEL

In order to communicate with other MIDI devices, the MIDI basic channel numbers of both units must match.

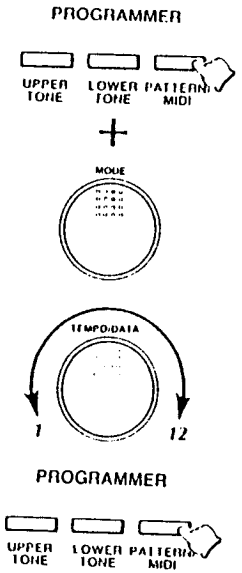
• To set the MIDI basic channel

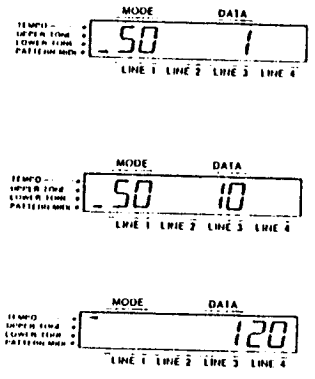
1 Press the PATTERN/MIDI key.

2 Turn the mode dial to select parameter number "50".

3 Turn the data dial to the desired MIDI basic channel number.

4 Press the PATTERN/MIDI key once again to return to the performance mode.





5 Be sure that all other MIDI devices are set to the same MIDI basic channel.

■ SETTING THE MIDI CLOCK MODE

The EH-6000 lets you select either internal or external MIDI clock modes.

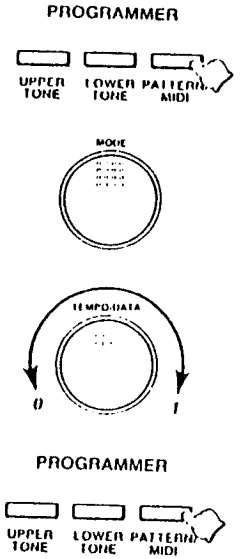
• To set the MIDI clock mode

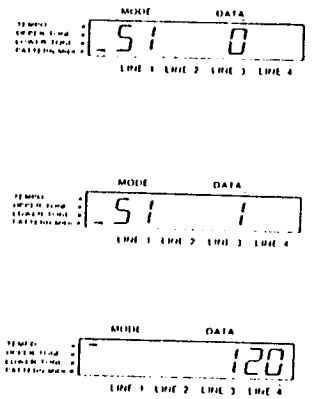
1 Press the PATTERN/MIDI key

2 Turn the mode dial to select parameter number "51".

3 Turn the tempo/data dial to select either INTERNAL CLOCK "0" or EXTERNAL CLOCK "1" modes.

4 Press the PATTERN/MIDI key once again to return to the performance mode.





Troubleshooting

For any malfunction, always check battery condition first. (see page 9)

Trouble	Possible Cause	Remedy
No sound, even if keys are pressed.	1. Main volume turned down. 2. Headphones connected. 3. Auto power off has activated.	1. Turn up main volume. 2. Disconnect headphones. 3. Turn the power switch off and then on again.
No rhythm.	Rhythm volume turned down.	Turn up rhythm volume.
No accompaniment.	Main and accompaniment volume turned down.	Turn up main and accompaniment volume.
Occasional interference.	Refrigerators, washing machines and similar electric appliances.	Use outlet as far away as possible from appliance thought to be the cause.
No sound when connected to external amplifier.	1. Main volume turned down. 2. Defective connection cord.	1. Turn up main volume. 2. Replace connection cord.

Care of Your Keyboard

Please observe the following precautions to assure safety and reliability.

Location
To avoid malfunction, do not use this unit in the following locations for extended periods of time:
- In direct sunlight.
- Exposed to extremes of temperature or humidity.
- In sandy or dusty places.

Power supply
Use only with rated voltage. Also, to help prevent noise and degraded sound quality, avoid using the same outlet as other equipment—particularly household appliances.

Handle gently
Do not drop the unit, as strong shocks will definitely cause malfunctions. Also, sliders and keys are designed to operate with a light touch. Excessive force may cause damage.

Keep it clean
Clean the keyboard with a soft cloth dampened with detergent. Never use paint thinner, benzene or other solvents.

In case of malfunction...
In the event that your keyboard does not function properly, check whether connections are made correctly, and that the unit is supplied with power (are batteries dead?). If the unit still does not work, contact the original retailer or local Casio dealer. Never attempt to repair the unit yourself.

Keep this manual
Store this manual in a safe place for future reference.

Specifications

Model:	HT-6000
Number of keys:	61 keys (initial touch)
Polyphonic:	8 notes
Upper tone:	Preset—20, Internal—20, RAM card (option)—20
Lower tone:	Preset—10, Internal—10, RAM card (option)—10
Auto rhythm:	Preset—20, Internal—10, RAM card (option)—10 • PCM rhythm source : 18 sources • intro/ending, synchro/fill-in, variation
Auto-accompaniment function:	Casio Chord ON/OFF, FINGERED • Accompaniment tones : chord—10, bass—4, obbligato—6 • auto-harmonize, dual-counter melody, variation
Key split:	Split point × 3
Effect:	Stereo chorus off/1/2/3, Pitch Bender, Key transpose, Modulation wheel
Synthesizing:	**Upper tone edit/Lower tone edit** **DCO/LFO:** WAVEFORM 1; 0-31, WAVEFORM 2; 0-31, (Lower tone: WAVEFORM 2; 0-15) VIBRATO DEPTH; 0-31, VIBRATO WAVE; 0-4, VIBRATO DELAY; 0-31, VIBRATO RATE; 0-31 **VCF:** ATTACK TIME; 0-31, DECAY TIME; 0-31, SUSTAIN LEVEL; 0-31, RELEASE TIME; 0-31, CUT OFF FREQUENCY; 0-31, RESONANCE; 0-7, ENVELOPE DEPTH; 0-31, VELOCITY; 0-31, KEY FOLLOW; 0-31 **DCA:** ATTACK TIME; 0-31, DECAY TIME; 0-31, SUSTAIN LEVEL; 0-31, RELEASE TIME; 0-31, ATTACK CURVE; 0-1, DECAY CURVE; 0-1, KEY FOLLOW; 0-31, NOISE ATTACK TIME; 0-31, NOISE DECAY TIME; 0-31, NOISE SUSTAIN LEVEL; 0-31, NOISE RELEASE TIME; 0-31
Chord/Operation memory:	Chord memory—427 chords MAX.(Internal/RAM Card : 2 banks each) Operation memory—197 setting MAX. (Internal/RAM Card : 2 banks each)
Pattern memory (Rhythm, Bass, Chord):	Internal—10 patterns, RAM Card—10 patterns MAX. [2 bars + 1 bar (fill-in)]
Terminals:	Line out [output impedance = 3KΩ, output voltage = 1V(RMS)MAX] Sustain × 1, Foot volume × 1, Phones × 1, AC adaptor (DC 9V), MIDI(IN OUT THRU)
Tuning control:	±50 cents (±1/4 tones)
Built-in speakers:	12 cm dia. × 2 (output : 2W + 2W)
Auto power off function:	6 minutes after last operation

Power source:	3-way AC/DC power source: • AC: 100,117,220 or 240V (±10V), 50/60 Hz, with optional AC adaptor AD-5. • DC: 6 D size manganese dry batteries. Battery life : Approximately 5 hours (SUM-1) • Car battery: Power taken via optional car adaptor CA-5.
Power consumption:	7.7W
Dimensions:	1000(W) × 350(D) × 93(H) 39 3/8"(W) × 13 3/4"(D) × 3 11/16"(H)
Weight:	8.2 Kg (18 lbs) including batteries
Standard accesories:	6 "D" size batteries, Dust cover, Score stand

**Design and specifications are subject to change without notice.*

GUIDELINES LAID DOWN BY FCC RULES FOR USE OF THE UNIT IN THE U.S.A. (not applicable to other areas).

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

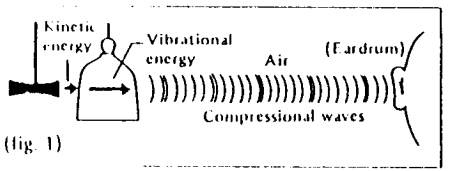
- ..... reorient the receiving antenna
- ..... relocate the computer with respect to the receiver
- ..... move the computer away from the receiver
- ..... plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

Appendix. The Synthesizer Sound Seminar

1 Sound

Every day, we hear a greater variety of sounds. Tones, the noise of car engines, doors opening and closing, footsteps, rain . . . and music. In other words, we live our lives surrounded by sound. We can't see sound, so how can we describe it?
Physics tells us that "Sound is vibration". Taking the sound of a bell as an example, we will try to pursue the basics of sound as it is produced and as it is heard.
When kinetic (motive) energy is applied to a bell with a bell hammer as shown in figure 1, a "deformation" of the bell occurs causing energy to work trying to restore the bell to its original state. A periodic repetition of deformation and restoration commences. This is called vibration.
This vibration causes pressure changes in the air. These are called compressional waves. They are similar to the ripples that occurs when a stone is thrown into water.
These compressional waves are transmitted to the human ear where they cause the eardrum to vibrate. These vibrations are picked up by nerves so we hear them as "sound". If the vibrating body differs, so will the vibrations, meaning that we also hear a different kind of sound. Outer space, where there is no air, is a world altogether without sound.



(fig. 1)

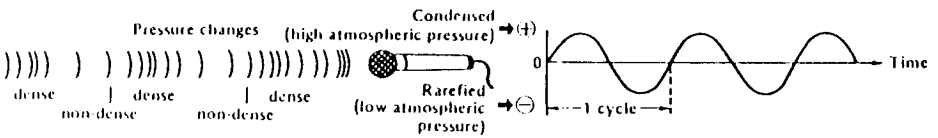
Remember

Sound is vibration of the air.

2 Wave Forms

—— Seeing Sounds With Our Eyes ——

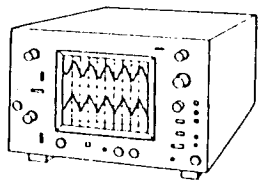
As explained above, sounds cannot actually be seen since they are vibrations of the air. However, you will often hear expressions such as "the wave form is different" or "this is almost a pure sine wave" concerning sounds. What is meant by "sound waves"?



Let's consider the mechanism of a microphone which is used as a means for picking up sound. A microphone converts sound into electrical signals which can be then transmitted to an amplifier and speakers. As shown in the illustration, these electrical signals are simple conversions of the vibrations of the air (the changes in atmospheric pressure) into electrical ⊕ and ⊖. When these changes are presented graphically, they can be interpreted as "wave and displays then as waveforms on a television screen. If we use this kind of a device, we can see sounds with our own eyes.
What we see are "waveforms". These waveforms differ greatly according to the sound and have various characteristics. These points will be explained later on in the Appendix.

Remember

If sounds are converted into electrical signals, they can be made visible as waveforms.


Oscillosope

3 Three Basic Elements of Sound

We now know that sound is vibration and that these can be seen by the eye as waveforms. But we have been talking about "sound" in general up to now without taking into consideration that there are high sounds and low sounds, loud sounds and quiet sounds, mellow sounds and sharp sounds . . . that is to say a great variety of sounds which we perceive very differently. In general, sounds can be classified according to "pitch", "volume" and "tone quality", which are called the "three basic elements of sound". In other words, sounds are determined by these three basic elements.

Remember

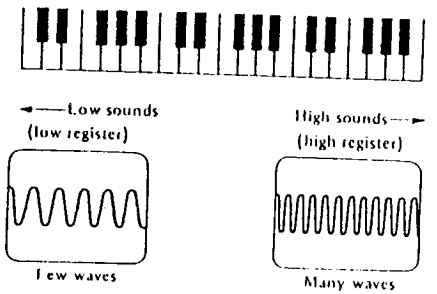
The "three basic elements of sound" are "pitch", "volume" and "tone quality".

We can now have a look at how these three basic elements are connected with the various waveforms.

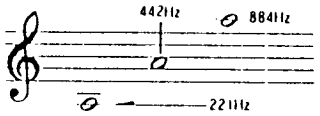
4 Pitch

—— The "first basic element of sound" ——

When you hit the keys of a piano, you will notice that the sounds get higher the further to the right a key is located and lower the further to the left a key is located. This "altitude" of a sound is called "pitch".
When sounds with differing pitches are compared on an oscilloscope, the number of waves per time unit differ. The higher a sound, the larger the number of waves; the lower a sound the smaller the number of waves.



The number of waves is actually the number of the vibrations causing the sound. For example, if we are listening to a violin, it would be the number of vibrations of the strings within a certain period of time. The higher the sound the larger the number of vibrations per time unit; the lower the sound the smaller the number. The number of vibrations within the space of one second is generally called the frequency and expressed in units called Hz (Hertz). 100 Hz indicates that vibrations occur at the frequency of 100 times per second. The larger the number of Hertz, the higher the sound. Also note that doubling the frequency of a sound will raise it by one octave, so we can say that frequency and pitch are related logarithmically.
The range of frequencies that can be heard by the human ear depends on the individual but is generally considered to be in the approximate range of 20 Hz to 20,000 Hz.



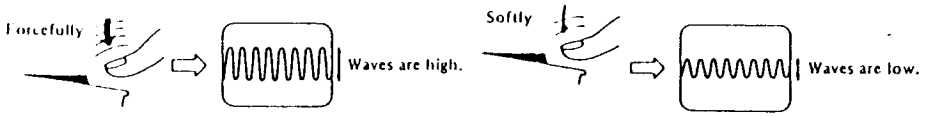
Remember

The pitch of a sound depends on the number of waves per time unit (the vibration frequency) and becomes higher as the frequency increases.

5 Sound Volume

—The "second basic element of sound"—

If you hit a piano key forcefully, the sound will be loud. If you hit it softly, the sound will be soft. When viewed on an oscilloscope, this change in sound volume can be seen as a difference in the height of the waves. The height of the waves is called their amplitude. The larger the amplitude the louder the sound.



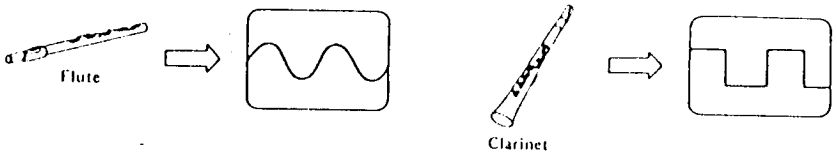
Remember

The sound volume is determined by the amplitude (height of a wave) – the larger the amplitude the larger (louder) the volume.

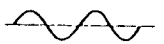
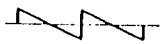
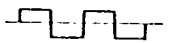
6 Tone Color or Timbre

—The "third basic element of sound"—

Even if you play a flute and a clarinet with the same pitch and about the same volume, you will not hear the same sound. That is because there is still one more distinguishing factor for sounds besides pitch and volume, known as "timbre".



When sounds with different timbres are viewed on the oscilloscope, it can be seen that the waveforms themselves differ. It is this difference in waveform that causes the difference in timbre. Generally speaking, rounded waveforms result in softer timbres, while "pointed" waveforms result in hard, brilliant timbres. Very basically, waveforms can be divided into the three types shown in the diagram below – sine waves, saw-tooth waves and square waves.

Wave form	Name	Timbre	Instruments
	Sine wave	Soft	Flute, whistle
	Saw-tooth wave	Bright	Violin, trumpet
	Square wave	Simple	Clarinet, oboe